

Vidya

V.9
January : 1966



GUJARAT UNIVERSITY

THE JOURNAL OF GUJARAT UNIVERSITY

VIDYA

General Instructions to Contributors

1. The Journal of Gujarat University is primarily intended to promote research work by teachers and students of the Gujarat University and its affiliated Colleges and recognised Institutions, and Post-graduate Departments.

2. Contributions embodying original research, abstracts of theses accepted by the University, reviews of books and Extramural lectures or abstracts therefrom, will be published in 'Vidya'.

3. Contributions intended for publication in the Journal should be type-written (with double-spacing) or legibly written on one side only of the paper. Two type-written copies are to be supplied.

4. Names of modern authors should be indicated in the manuscript by double underline. Titles of books and journals should be indicated by single underline. Titles of articles mentioned in the contributions should be enclosed within double-quotation marks.

5. Foot-notes should be serially numbered.

6. Line drawings or photographs may be sent to illustrate the contributions.

7. Students and Research Fellows should submit their contributions only through the Heads of their Departments.

8. Persons connected with the Gujarat University otherwise than as teachers or students may also submit contributions for the Journal of Gujarat University.

9. It is presumed that contributions forwarded for publication in the Journal of Gujarat University are not submitted for publication elsewhere.

10. The copyright of all the contributions published in the Journal of Gujarat University will vest jointly in the Gujarat University and the author or authors.

11. Twenty-five off-prints will be given to the contributors free of charge. Additional off-prints may also be supplied at the cost of the contributors, provided order is placed for the same along with the corrected proofs.

12. Articles not printed will be returned to the contributors.

13. Tables and figures should be given separately with an explanatory heading. Their places of insertion in the paper should be indicated in the margin of the manuscript. Diagrams should be drawn in India ink on Bristol or smooth white card and lettering should be in pencil.

(Continued on cover-p.)

VIDYA
THE JOURNAL
of
GUJARAT UNIVERSITY

Vol. IX

January : 1966

No. 1

: EDITORIAL BOARD :

Professor B. R. Shenoy — Chairman,
M.A. (BANARAS), M.Sc.
(ECON.) (LOND.)

Professor Umashanker J. Joshi, M.A.

Professor P. H. Prabhu,
PH.D., F.A. PSY. A. (U.S.A.), F.A.A.A.S

Professor J. J. Chinoy, M.Sc., PH.D.
D.I.C., F.N.A.Sc



Published by the
GUJARAT UNIVERSITY
AHMEDABAD-9

**ગુજરાત યુનિવર્સિટીએ પ્રસિદ્ધ કરેલી જુદા જુદા વિષયોની
પરિભાષા - પુસ્તિકાઓ**

વિષય	કિંમત
	રૂ.
(૧) ખાદ્યવિજ્ઞાન (પદવીકક્ષા સુધી)	૦.૫૦
(૨) શિક્ષણ	૦.૩૦
(૩) ભૂગોળ	૦.૩૦
(૪) ગણિતશાસ્ત્ર	૦.૭૫
(૫) ભૌતિકશાસ્ત્ર	૦.૭૫
(૬) ભૂતતરંગશાસ્ત્ર	૧.૧૨
(૭) રસાયણશાસ્ત્ર (પદવીકક્ષા સુધી)	૦.૫૦
(૮) સમાજશાસ્ત્ર	૦.૫૦
(૯) વનસ્પતિશાસ્ત્ર	૦.૭૫
(૧૦) ગણિતશાસ્ત્ર (પદવીકક્ષા સુધી)	૧.૦૦
(૧૧) રાજ્યશાસ્ત્ર, નાગરિકશાસ્ત્ર તથા વૃત્તવિવેચન	૦.૬૦
(૧૨) પ્રાચીન સંસ્કૃતિ, ઇતિહાસ અને પુરાતત્ત્વ	૦.૬૦
(૧૩) અર્થશાસ્ત્ર	૦.૮૦
(૧૪) યાત્રિક ઇજનેરી અને જલશાસ્ત્ર તથા જલસંચય	૦.૮૦
(૧૫) આયુર્વિજ્ઞાન	૩.૭૫
(૧૬) પ્રાણીવિજ્ઞાન	૧.૦૦
(૧૭) મનોવિજ્ઞાન, તર્કવિજ્ઞાન અને મુખ્ય ધર્મો ને ધર્મતત્ત્વજ્ઞાન (દ્વિતીય વર્ષ વિનયન કક્ષા સુધી)	૧.૧૨
(૧૮) સાહિત્ય અને ભાષાવિજ્ઞાન	૦.૭૦
(૧૯) મનોવિજ્ઞાન અને તત્ત્વજ્ઞાનની પરિભાષા (પદવીકક્ષા સુધી)	૧.૫૦
(૨૦) કાયદાશાસ્ત્ર (પદવીકક્ષા સુધી)	૦.૭૫
(૨૧) સામાન્ય અને પ્રાકૃતિક ભૂતતરંગશાસ્ત્રની પરિભાષા (પદવીકક્ષા સુધી)	૧.૧૨
(૨૨) ભૂગોળ (છપાય ૭)	

— — —
: પ્રાસ્થાન :

ગુજરાત યુનિવર્સિટી કાર્યાલય

નવરંજપુરા, અમદાવાદ-૬

CONTENTS

Sr. No.	Article	Author's name	Page
1.	An Account of Broach (During the Nawwab Rule and after) Gathered from <i>Majma'a-i-Danish</i>	.. Dr. C. R. Naik	.. 1
2.	Three Gypsy Formative Suffixes	.. H. C. Bhayani	.. 20
3.	Chandra Bhān Brahman—Life and Works	.. Dr. M. A. H. Farooqui	.. 26
4.	‘પ્રેમાનંદ’નાં નાટકોને ‘આખ્યાન’ નામ શા માટે?	.. જગદીશ વ. દવે	.. 41
5.	The Vision of Kamala Markandaya	.. Dr. Ram Sevak Singh	.. 45
6.	"Rasavadādi Alamkāravarga"	.. T. S. Nandī	.. 59
7.	ભારતીય તાર્કિકોની પ્રત્યક્ષવિષયક ચર્ચા	.. ડૉ. નસીમ છ. શાહ	.. 79
8.	ભારતીય ઇતિહાસના કહેવાતા અંધકાર યુગો	.. ડૉ. ર. ક. ધારેલા	.. 91
9.	Application Blank as a Tool of Personnel Management	.. Miss Jayshree Desai	.. 100
10.	Institution of Marriage	.. Dr. K. R. Chandra	.. 112
11.	A Note on the Urban Growth in Saurashtra	.. P. H. Parekh	.. 124
12.	Summary of the Report on Investigation of Underweight Students of Gujarat University	.. E. M. Best B. N. Mazmudar R. M. Vaidya C. I. Jhala A. N. Bhatt	.. 129
13.	Philosophical Criticism of Freud's Views	.. Harsiddh M. Joshi	.. 131
14.	Curriculum Change in Social Studies	.. Dr. Jagadish P. Dave	.. 143
15.	The Study of Growth Pattern among the Children under Five Years of Age in Cambay	.. Dr. Harkant D. Badami	.. 162

<i>Sr. No.</i>	<i>Article</i>	<i>Author's name</i>	<i>Page</i>
16.	Non aqueous Titrimetry	.. A. M. Trivedi K. P. Soni I. M. Bhatt	.. 169
17.	'સામાન્ય સ્થાન-વિજ્ઞાન' (General Topology)	.. ડી. વી. રાવલ પી. વી. ખરેખ	.. 185
18.	Occurrence of Characiosiphon Rivularis Iyeng. from Gujarat	.. R. J. Patel J. J. Shah	.. 194
19.	"Flora of Vallabh Vidyanagar Area"	.. J. G. Chohan J. A. Inamdar M. B. Deshpande	.. 197
20.	Further Contribution to the Flora of Gujarat State	.. C. L. Shah J. A. Inamdar	.. 217
21.	Formulae Similar to Frenet's Formulae.to a Curve	.. Darshan Sing	.. 228
22.	Thioureas	} .. S. P. Kharidia .. J. J. Trivedi	.. 239
23.	Thiazolidones — Part VIII		.. 244
24.	On Growing Single Crystals of Bismuth	.. V. P. Bhatt	.. 247
25.	Conductometric Studiesin Mixed Solents	.. A. M. Trivedi K. P. Soni I. M. Bhatt	.. 253
26.	ગુજરાતમાં ખનિજ તેલની ઝોજ	.. ડી. કે. એ. નાથલ	.. 260
27.	Relation betweenin Soil Extracts	.. R. K. Shah J. C. Vora	.. 265

AN ACCOUNT OF BROACH (during the *Nawwāb* Rule and after)
GATHERED FROM *Majmu'a-i-Dānish*

DR. C. R. NAIK

University School of Languages,
Gujarat University, Ahmedabad-9

The *Majmu'a-i-Dānish* (or Compendium of Wisdom), a manuscript¹ containing epistolary correspondence is a rare work in Persian having an importance of being the record of contemporary events of Broach during the *Nawwāb* rule.

I

Very little is known about the compiler of the *Majmu'a-i-Dānish*, Keshūrdās. He belonged to the *Bhārgāo* Brahmin community² of Broach; some members of this community exhibited remarkable statesmanship, valour, loyalty and intelligence during the *Nawwāb* rule as is evident from the work. His father was Chhabildās who was the son of Madhubhai Vyāsā³. Keshūrdās took his education in the *maktab* of Shaikh Muḥammad Shukrullāh⁴ who was considered to be a

¹ It is now with Shree Kanaiyalal M. Munshi. The materials arranged here are from that work, whether authenticated in the footnote or not.

² Of the Brahmins, the *Bhārgāos* claim to be the original Brahmins of Broach and to be the descendants from the great Rishi, Bhṛagu, the founder of the City of Broach.

³ Madhubhai Vyāsā alias Viththaldās was the *sūbadār* of some province, in about V. S. 1750 (A.D. 1694); but nothing has been known about the place where he worked in that capacity. [Shree K. M. Munshi: *Adadhe Raste*, p. 11 (Gujarati)]

⁴ In the preface Keshūrdās has cited an example of his behaviour with his pupils. He says "One day after being free from the lesson of the day when after saluting, I got up, a boy sat in my place to take his lesson. He was inattentive and while reading he was dozing. Having turned an angry look to him, Shaikh-Ṣāheb said, "Oh idiot, put your fingers on the letters so that you will recognise them and they will recognise you. If you do not know them, they will not care for you".

very efficient teacher. When he attained the marriageable age, Harivallabhdās, son of Nandalal Pathak gave him his daughter in marriage. She was the only issue of her father; so the latter gave away in dowry the *munshigiri*⁶ of the *pargana* of Broach which he had inherited from his father.⁶ Then Harivallabhdās married again and he had a son who was a maternal ancestor of Shree Kanaiyalal M. Munshi,⁷ one of the eminent lawyers and scholars of India.

After Keshūrdās completed his studies, his father-in-law, Harivallabhdās — whom he has described as the 'raging ocean of eloquence' — provided him in the government of Mirzā 'Abdullāh Beg also known as Nek 'Ālam Khān with a post in the *Dāru'l-Insha* (or Chancellery) in which he was an employee. He received from him very nice training. The drafts prepared by Keshūrdās elicited his appreciation. When Harivallabhdās was appointed *dawān*, Keshūrdās was promoted to be the head of the department. Subsequently Harivallabhdās died. Keshūrdās was extremely distressed by the death of his father-in-law and thought of resigning. In these circumstances the most talented man of the time in Broach, Lallubhāi⁸ came to his rescue. He appreciated his work by associating him as his co-worker and treated him so well as to make him forget the sad loss he had suffered. Thereafter he continued the work with zeal and avidity.

⁶ The annual collection of one rupee per village in the *pargana* of Broach.

⁶ Nandalāl Pāthak was employed in the royal *daftarkhāna* (or the office where the archives were kept) in Delhi. Muḥammad Shāh (A.D. 1719-49) was so pleased with the perusal of the Persian poems composed by him that he awarded him the *munshigiri* of Broach by way of appreciation. While coming to Broach from Delhi he was way-laid and murdered by outlaws in the forest of Devgadh Bāriā.

⁷ His ancestral line runs thus upto the time of Keshūrdās: Jugalsū → Kāhāndās → Narbherām → Maneklāl → Kanaiyālāl.

⁸ He belonged to the Modh Brahmin Community. The community is so called from Modhera, once an important place in the Chhapra Taluka of the Mehsānā District.

Assignment of Broach....

On Rabi I 4, 1185 (A.D. 1767),⁹ Emperor Shah 'Alam II issued a *farman* to the *shahdar* of Ahmedabad to confirm the hereditary *munshigiri* of Broach to the name of Keshūrdās according to the *sanad*.

On May 17, 1782, the East India Company gave Broach to Sindia and on *śraavana* 3, Vikram Era 1848 (A.D. 1792), Keshūrdās was given the *ijāzat* of some villages on the *qasr-patta* (or written agreement) of five years.¹⁰

II

The manuscript of the *Majmu'a-i-Danish* measures 9½" x 5" x 2" and comprises 589 pages, every page containing 17 lines closely written. It was at the instance of Lallubhai that Keshūrdās compiled this work.

Before coming to the estimate of the style and the language used in the petitions and letters contained by the work, it must be noted that in A.D. 1582, Todar Mal, the revenue Minister of Akbar got an imperial *farmān* issued to have all papers written only in Persian (instead of one set in Persian and a duplicate set in the Hindawi language during the reign of Sher Shāh). Since then it gradually became the medium of expression in literary, historical and other writings in India.

During the early period of the East India Company, even the English tried to maintain the past importance and position of Persian and they themselves used Persian as the medium of communications. A large number of Hindus could write very good Persian and the English encouraged them to write books in it. It was practically the common language in which educated Indian gentlemen interchanged their thoughts and opinions.

During those days, the position of the *munshi* was a very responsible one; the impression of the power and greatness of the state depended largely on his diction. His documents were judged by addressees on their face value i.e. on the dignity of

⁹ Shree K. M. Munshi : *Adadhe Raste*, p. 30.

¹⁰ Ibid. p. 17.

4

the language employed, the high tone of the rhetoric displayed and the powerful manner in which the object was expressed.

As such in this work, the petitions addressed to Emperor Shah 'Ālam II and Minister Shujā'u'd-Dawla have been loaded with the long train of titles, rhythmic diction and cut and dry phraseology according to the practice of the age. The virtues have been prescribed in the superlative degree. The titles used are fixed and customary. Mere acknowledgement by the Nawwāb of a *farman* from the emperor occupies the space of more than ten lines. It may, in fairness, be admitted that the encomium on the addressee in petitions and letters was not offensive to the current taste and the custom prevailing at the time. The communications drafted are in connection with peace, alliance, warfare and various social and political points of first rate importance on which the welfare of the state materially depended. This collection comprises materials of statistics and throws some light on the social, political, cultural, religious and economic conditions of Broach during the period.

The *munshi*, in his ornate style goes to the extent of describing horsemen as planets in the field of the revolving sphere, provided with globes of lights, the lassos of glances, the arrows of meteors and the stirrups of pole-stars.

The enemies have been described as God's condemned creatures and the vilest of mankind. The climax is reached when the *munshi* condemns them to the lowest pit of hell.

The Hindu *munshi* calls Emperor Shah 'Ālam, 'The Arjuna of the age' and intensifies the statement by adding, "Nay, Arjuna cannot reach the lowest range of the intrepidity of Your Majesty and cannot weigh in the balance of equality."¹¹ In another petition he says, "Between Arjuna and Your Majesty, there is the difference to the extent between the earth and the sky." In one petition he goes to the extent of stating about the emperor: ترا چنانکه تویی کسی چگونه وصف کند (How can one describe you as you are?)

¹¹ Text, p. 360.

Due to the prevalence of Persian as the state-language, even letters to Hindus were also written in Persian. The letters in the work under review are about appointments, recommendations, accounts of articles purchased, congratulations on occasions of joy, tender sympathy with friends in trouble, condolences, invitations to attend wedding ceremonies, the replies to them and thanksgiving for the same etc.

With regard to these letters and petitions following points are also noteworthy :

The writer does not mention regularly the name of the year in which a particular letter or petition was written but at times he has contented himself with the name of the month specifying the exact date; and in such cases, in the absence of any mention of the time the circumstantial evidences would provide a strong clue to it.

The reader in some places comes across the Indianised language and many Indian words and phrases like پرساد (the food offered to the divinity), دهات والہ (villager), رام رام ('RāmRām' by way of salutation), کنکوٹری (marriage-invitation-card), سوگند گیتا و بہاگوت (swearing by Gīta and Bhāgavata, etc.).¹² Though this creates confusion for Muslim readers it is quite inevitable to maintain the tone as it is a known fact that the language has the influence of the atmosphere round about.

III

In the exordium, immediately after the praise of the Creator, the compiler has narrated some incidents of his life and has incorporated therein a brief history of the *Nawwāb* rule; particularly that of the last two *Nawwābs* is noteworthy from the view-point of the subject. The first of them was Mirzā Hāmid.¹³ On account of his good administration, he was honoured with the titles of Nawwāb, Dawla and Bahādur by

¹² Vide Text, pp. 507, 520, 523, 527, 553, 582, 586.

¹³ This may be Ahmad and may be the mistake of the scribe.

6
 Sixth 'Ālam, the then emperor of Delhi; and as such he was called Nawwāb Rafi'u'd-Dawla Nek Nām Khān Bahādur. He ruled without any trouble for twelve years and died in A.D. 1768. He was succeeded by his son Imtiyāz Mu'azzaz Khān who ruled for about five years. During that period the Marathas often appeared before the fort of Broach to capture it. The Nawwāb remained perturbed and repeatedly wrote petitions to the emperor of Delhi for help. The emperor wrote many *farmāns*¹⁶ containing lip-sympathy; in one of them he exalted him with the favours of a sword and the title of 'Diler Jang in addition to those of Dawla and Bahādur as a mark of patronage.

As for the political conditions of Broach during the period it may be noted that Nawwāb Rafi'u'd-Dawla entrusted the reins of entire administration to the capable hands of Mehta Bhaidās and Mehta Bhukhandās. They have been cited by the compiler as Todar Mal and Birbal of the age. They impressed the rulers of neighbouring territories with the efficient management of their relative concerns; as such Sayajirao Gaikwad favoured them with a sheet, a staff, a *risāla* (or a troop of horse), *sarpech* and the village of Mangleshwar. First Mehta Bhaidās died and thereafter Bhukhandās carried on the work of management. When the latter passed away Lalludās succeeded him in the administration. He attained absolute authority to the same extent as his predecessors. After the death of Nawwāb Rafi'u'd-Dawla, Imtiyāzu'd-Dawla Mu'azzaz Khān succeeded him. He left to Lallubhāi the same authority as he had been enjoying and conferred upon him, the favours of a fine *dandār* (or turban) with a *figha*¹⁷ and a *sarpech* set with jewels.

As for Mu'azzaz Khān, the throne proved to be a bed of thorns. The East India Company was always for amassing money. The English created troubles for him every now and

¹⁶ They are included in the text.

¹⁸ It was bound round the turban and was often enriched with jewels.

¹⁶ Now in the Broach Taluka.

¹⁷ An ornament worn in the turban. It was kept sideways vertically.

them. They put forth an excuse that there were certain claims of the *Nawab* of Surat upon the customs revenue of the port of Broach. These claims along with a sum due to the English on account of an excessive levy of duties on cloth amounted altogether to Rs. 1,50,000. The *Nawab* of Broach was asked to pay the same. The English came to an understanding with the *Nawab* of Surat to recover it on the condition that a part of it be paid to the Company for their trouble. Then they started making strenuous efforts to do so by fair means or foul. To compel the *Nawab* to propose some settlement, a force was dispatched in A.D. 1771 to Broach by land under the guidance of Mr. Gambier. To check them, a troop was sent by the *Nawab* of Broach, which was beaten off by the English. Thereafter, posting themselves on an island in the river, the English directed their guns against the city. But unfortunately for them, the magazine caught fire and blew it up.¹⁷ A number of men of Mr. Gambier were killed on the spot by the poisonous gas and "several flew into the air like cotton being thrashed by a carder".¹⁸ In spite of this catastrophe, some people of Mr. Gambier advised him to stick to the place and not to give way. But their munitions had been reduced to ashes. Moreover, the river became less stormy, its water-level fell low and hence it was more favourable for retreat. Under such circumstances he sent to the *Nawab* a servant named *Hirji* with a message to avoid the dispute and recommended that he should send *Lallubhai* as his representative to settle it. He waited for the reply. The *Nawab* called *Lallubhai* for consultation; but meanwhile Mr. Gambier led his troops back to Surat. In brief, the attempt of the English to capture the fort of Broach failed.

Later on, the *Nawab* of Broach wrote a letter to the General in Bombay, offering to meet him there. The move was welcomed and a warm invitation was extended to him. All preparations for his voyage were made and all facilities in conformity with his desire were given. Special vessels were sent to

¹⁷ Text, p. 208.

¹⁸ From the text.

Surat for the purpose. Some of them were storeyed. The *Nawwāb* was to embark from Dumas.²⁰ He set out after the close of the rainy season in A.D. 1771. As there was the danger of pirates, the *Nawwāb* took with him a contingent of two hundred strong consisting of Arabs, Rohillas, Sindhis and Rājputs. The vessels stopped at Māhim²¹ from where two men went to Bombay by 'Machhawa' to inform the General about the *Nawwāb's* arrival. The General gave the *Nawwāb* a hearty reception and treated him with every consideration. The *Nawwāb* was made to agree to turn over the duties collected on the English trade as well as all goods brought to or exported from Broach under the English pass. After his return, the *Nawwāb* refused to carry out the terms of the treaty forced upon him. Consequently Broach was attacked again in the end of the year 1772. The *Nawwāb* could not offer resistance, fled away with his son, Nannooji *alias* Mumtaz Khān and sought shelter from the Thakor of Āmod (then called Maqbūlābād). Ultimately the *Nawwāb* died in miserable circumstances at Dehwan near Mehwās on Zīl-hijja 28, 1186 (A.D. 1772). Lallubhāi was present there. He sent the dead body of the *Nawwāb* to Broach and settled the accounts of Gaikwad and the English. Both were immensely satisfied with the terms proposed by him for settlement so much so that Gaikwad awarded him with an elephant, horses and *khi'at*.

Lallubhāi was adept in physiognomy. He could speak Marathī, Hindi and Persian with equal ease and fluency as if each of them was his mother-tongue. He was awarded the title of Lallurām by Emperor Shah 'Ālam with his own imperial seal when the last *Nawwāb* received the title of Imtiyāzu'd-Dawla Bahādur Diler Jang.

²⁰ It is on the left bank of the river Tāpti.

²¹ Now a suburb of Bombay.

²² It was composed of *chitra* (or turban), a *patka* (or girdle) and a piece of stuff for a *jama* (or gown). All these pieces used to be of malmal (or muslin) embroidered in gold, silver and silk upon the most elegant pattern.

Lallubhāi enjoyed the confidence of Nawwāb Mu'azzaz Khān to such an extent that while leaving Broach for Bombay, the latter appointed a council of management consisting of seven courtiers; and this trusted and favourite *diwān* (Lallubhāi) was to act on his behalf in his absence. For this purpose, he executed a *mukhtār-nama* (or power of attorney) with twenty rules of conduct. At the top he endorsed it in his own hand with the following couplet :

سپردم بتو مایہ خویش را تو دانی حساب کم و بیش را

[I have entrusted to thee my belongings; now you have to keep an account of its credit and debit sides.]

Lallubhāi continued to play his role in the management of political affairs. Making a shrewd use of the wealth inherited and earned by him he succeeded in capturing the administration of the city and *pargana* of Broach after the death of the last Nawwāb and before 1773. According to the popular tradition "the loss of Broach was partially due to Lallubhai's intrigues at last".²³

IV

In the work, there are also available unrelated and disjointed pieces of information about isolated events, some of which are of a purely domestic character and private individual interest. However, their importance is obvious to any one conversant with the importance and uses of historical sources.

Dāmājirāo Gaikwād was the representative of the Marathas in Gujarat. He was called Senā Khāṣ Khail Shamsher Bahādur. He had certain property in the city and *pargana* of Broach. He was very shrewd and circumspect. He avoided strong attachment to the Peshwa and also open defiance. He devoted all his energy mainly to consolidating his power in Gujarat and extending and resuscitating the fortunes of the Marathas in Gujarat and Kathiawar. He died in A.D. 1768. At that time,

²³ "સરકારે છે; વાતોમાં ને વાતોમાં ભરતે જાય એમ છે." (Shree K. M. Munshi: *Adulhe Raste*, p. 19)

Dāmājirāo's son, Govindrāo was in Poona; so he was in a position to offer conditions for the confirmation of his rights without loss of time. But he was not allowed to join his charge in Gujarat. Dāmājī's another son, Sayājī had entrusted his interests to his brother, Fathsingh²⁴ (the third son of Dāmājī).

The Peshwa was making efforts to extend his own influence in Gujarat and he appointed Sayājirāo with Fathsingh as his 'muta'alliq' (or deputy). By agreeing to pay an extra sum of 6½ lacs of rupees annually, the latter got permission to retain the Poona contingent of the Gaikwad house in Gujarat. All this resulted into the profit of the Peshwa's party and the injury of the tax-paying people of Gujarat.

V

Some of the materials indicate the normal procedure followed in the state in the execution of various affairs. They give some insight into what may be called the departmental machinery.

For revenue purposes, the unit was a *mahāl* (or division). It was a whole *pargana* or a part of a *pargana*. The port or the city might form one or more *mahāls*. Other sources of state income (such as customs) were also divided into *mahāls*.

The *Nawwāb* maintained a custom-house near the *furza* (or dock) which used to be under the management of the *dārāgha* (or custom-officer) and his subordinates called *mushrif* (or accountant), *taḥwildār* (or treasurer) and *darbān* (or watchman). The navy was under the command of the *mir baḥr* (or captain) and his subordinates.

For the revenue administration there was an officer styled *muta'addi* (or revenue clerk). His duties were to collect and submit the statements of the revenue received from officers-in-charge of different fiscal divisions. These subdivisional officers realised the revenues through the hereditary posts of the *deans* and *muqaddams*. The state demand was normally one-half share

²⁴ Text, p. 27.

of the produce. There was also an arrangement for the final distribution of the total payment among the shareholders in joint villages and the individual cultivators from single villages.

The assessment of the state's share was determined by the inspectors of the growing crops; the peasant's liability was fixed before the produce was ripe. The amount to be paid by a village for the *Nawwāb's* share was commonly settled year by year between the official, assessor and husbandmen acting on behalf of the peasants.

The *desai* had more particularly to assist the settlement of the revenue and to report on the state of the crops. The *majma'-dar's* duty was to keep the accounts of the assessments of the *mahal*.

Needy husbandmen were assisted with advances of money for the purchase of cattle, seed and whatever else they might want at the beginning of the rainy season. These advances were recovered gradually. For the same, the produce of the field was often mortgaged to the money-lender who in turn secured the crop and paid or became a security for the payment of the Government cess.

Besides the territories under direct administration, there were many outlying parts which still remained under their own *zamindārs* or local chiefs. These *zamindārs* paid the *peshkash* (or tribute) which was often not forthcoming until the *Nawwāb* collected it in a *mulgiri* expedition.

Several times, forced taxes were collected by the Marathas and Peshwas and in order to check such movements, the *Nawwāb* used to employ *sehband*²⁸ sepoys. This constituted an extra burden of expenditure every year. These *sehbandis* were recruited from amongst Arabs, Rohillas, Sindhis and Rājputs residing locally.

²⁸ The local semi-military corps. This militia was provided with a uniform, sufficiently plain and un-military, to make them easily distinguished from regular troops. They were armed with repaired fire-locks and such other weapons and arrangements were made for teaching them a certain amount of drill.

The Maratha tribute collecting expeditions were conducted on model of those of the Mughals and the names of these levies were, for the reason, borrowed from them. They were *kah-dana* (or hay and grain), *peshkash* (or tribute), *nālbandi* (or light tribute) etc.

VI

The work contains some references, providing information about the economic life during the period.

There seems to have been a regular postal system and the post reached from Broach to Delhi normally within ten or twelve or at the most fifteen days. The officers of territories whoever they would be, made an arrangement to escort the couriers safely beyond their jurisdiction.

The system of sending money also existed. Kings, nobles and merchants could remit money as well as articles from one place to another. The security of contents were guaranteed.

There were big companies of traders in cities like Broach, Surat and Bombay. During the period under review, there were some Parsees²⁶ in these cities whose houses were called '*Kothis*'. In them, the amounts of money for business purposes were deposited. A receipt was given for the same and a mention was made as to where it was to be cashed.

The people during those days were so honest in their dealings that any known or unknown person could deposit big sums with these companies without any witness. The money was returned when demanded. If any person due to the fear of robbery on the road could not carry big sums with himself, these companies took possession of his money and kept it in their custody and a *hundi* was given to him. The written word it bore was its only bond. It was the only means of financing the movement of goods and of effecting the transfer of funds. Travellers to distant places like Brundāban and Bombay carried money in *hundis*; so did visiting traders and officers to remote places.

²⁶ Text, p. 26.

It is found from the perusal of *farmans* and petitions that pigeons were trained to work as post-carriers to take post to distant places and as such there was the *farmāish* from Shah 'Ālam in several *farmāns* addressed to the *Nawwāb* of Broach for a pair of pigeons. The *Nawwāb* procured them from Surat noted in those days for the very intelligent species of these birds.

Cloth of different varieties was the chief manufacturing industry in Broach. It was one of the important items in which trade was carried on a large scale there. The varieties were: *Bharāchi* plain *doria*, coarse as well as fine *bāfta* for *anga-rakhās* (or coats) and *jāmas* (or coats); skilfully woven *fota*; doubly woven *doshalas* of delicate costly stuff costing twelve to fifteen rupees; *Gujarātī alacha* woven in silk or in silk and cotton, red and white or blue and white, and more elaborate patterns flowered²⁷ or embellished with gold and silver thread; *chaddar* worn loosely over the upper part of the body; strong coarse *dots* for sail-making; *kamkhāb* (or brocade); *makhmal* (or velvet) etc. There was a considerable demand for the same in the far northern parts of India and Rājasthān.

Surat also called *Babu'l-Makka* (or the Gate of Mecca) and *Bandar-i-Mubarak* (or the auspicious port) during the days of the *Nawwāb* rule was enriched by English and Dutch commerce. For Broach and places round about, it was the marketing place for foreign articles; so on the receipt of the *farmāish*, the *Nawwāb* used to make purchases of articles like spectacles, rose-water, dentifrice,²⁸ Chinese silk²⁹ etc., from Surat.

Materials like sugar and foreign cloth etc. in big quantities for marriage and other purposes could be had from Surat. However, people were put to great inconveniences as they were required to take permits from *ta'alluqdār* of the dock of Surat, the chief of the Valanda Company and the English factor.

The *Nawwāb* also received the *farmāish* from Emperor Shah 'Ālam and Minister Shujā'ud-Dawla for the *cheetas* (or

²⁷ Text, p. 575.

²⁸ Ibid. p. 527.

²⁹ Ibid. p. 521.

panthers) found in Islamnagar, Palampur and places round about them as they were considered to be of a superior quality. He was also required to send pairs of *silghas*²⁰ (white-footed antelopes), deer and elks as they were very fond of these found in Gujarat. The emperor and the *Nawab*s of North India were also interested in having *khos* (or the sweet-scented roots of *andropogon muricatum*) for lathies and tobacco for smoking in *huggas*. In a *farmān* sent for the supply of tobacco to the *Nawab* of Broach, Šifdar Jang Bahādur (Šhuja'ud-Dawla) has praised it to the skies while acknowledging the receipt of four maunds previously received.

In the work, there are several mentions of orders for sandal-fans and the jam of pine-apples.

There are several names of boats and ships plying between ports for ferry services. There were *batelas*²¹ for sea-trade, *marshkharas* for loading and unloading ships and vessels, *pannis*, *galbats* etc.

VII

In the letters of social relations addressed to Muslim friends and relatives, some are such that they have in the end names like Uwais, Dhū'n-Nān, Janaid, Mu'rūf etc. selected to mark termination; they were renowned Muslim saints. In certain letters, there are نون and ماد in the end. Evidently these are the letters of the Arabic alphabet and stand for the two qur'ānic chapters which are known as الزون and الماد on account of their opening letters.

The fine literary taste in the letters reveals itself in the selection of graceful and charming verses of Persian poets. Among poets whose verses have been quoted, Sa'di and Hāfiz stand pre-eminent.

²⁰ Text, p. 487.

²¹ Ibid. pp. 486-87.

There are letters in connection with the wedding³³ of *Maharaja*,³⁴ *Pannjwanda*³⁵ and *Ichchikantwar* (nephew, son and daughter respectively of *Lallubhai*). In all letters of invitation the *Hijra* (lunar) day, month and year have been mentioned. In letters addressed to Hindus, the dates of the *Vikram Era* have also been given in addition to those of the *Hijra* calendar.

In letters addressed to Muslim invitees, the name of the daughter has invariably been dropped because they consider female relatives either too insignificant to be mentioned or too sacred and unapproachable to be brought into the glaring and unholy light of publicity.

Lallubhai sent invitations to *nawwābs*, *rājās*, *dhawāns*, *qāzīs*, English chiefs, *Valanda* (or *Dutch*) factors, several high officials etc. of different places taking from *Surat* to *Jaisalmer*, *Ratlam* and other distant places.

The invitations were written on cards of red colour, edged with gold and the writing done in gold letters.

In drafting the invitations, undue regard has been paid to the relative position of the person who has written and the addressee, according to the practice of the day. The contents are not the copies of one draft as is in vogue now-a-days; for different addressees, there are different contents. They are not clear and direct in statement and as brief as is consistent with a distinct setting forth of the writer's object. They are affected in tone and forced and laborious in expression. The most noteworthy peculiarity is the bombastic language and fulsome flattery of the addressee. Some illustrations are cited below :

"As our relations are of the same type as of the light with the candle and of the fragrance with the rose."³⁶ "You should make the house of joy and pleasure bright like the mirror-

³³ Text, 503, 507.

³⁴ *Mahatma*: 1-1 and of *Ichchikantwar*, 7th of the same month.

³⁵ *Jamādī I* 7, 1203, *Māgār Sud* 9, *Budh* (p. 584).

³⁶ Text, p. 511.

house."³⁶ "Carrying out the universal custom that Shree Kṛṣṇa Kanaiya went to the house of Vidurājī as a guest and gratified him by accepting whatever food was ready in his house."³⁷ "In favouring an atom, the sun will undergo no detriment." The nuptial presents were accompanied with the letters of such request as "Kindly accept the humble present of the leg of the locust sent to the great king, Solomon."³⁸

The request in invitations addressed to the *narowābs*, *rājas*, *begams* and *ranis* was to send their representatives³⁹ and to the people of equal ranks and high officials to attend with brothers and sons.⁴⁰

The contents of the reply of Khānsāheb Mīr Najmu'd-Dīn Bahādur of Radhanpur is noteworthy:

"Your card of invitation on the happy occasion of the marriage-ceremony put in the envelope of pomegranate colour intermingled with red, snatched⁴¹ away on account of its excessive effulgence the brilliancy of the stars in the sky and the drops of saffron strewed thereon made the men in the eyes⁴² so intoxicated in joy as if they are loitering round the saffronfield in Kashmīr."⁴³

Wedding presents comprised horses, doubly woven *doshalas*, *thans* of costly stuff,⁴⁴ *jīghas*, amounts of Hindawi rupees 21,

³⁶ Text, p. 55.

³⁷ Ibid. p. 514.

³⁸ Solomon, David's son who possessed a magic signet ring on which was inscribed "the greatest name" (of God) by virtue of which he commanded not only mankind but birds, beasts, genii etc. He harnessed the wind as the steed to his chariot, he conversed with birds in their own tongue and the wise and magnificent Āsaf was his prime minister.

³⁹ Text, p. 512.

⁴⁰ Ibid. p. 511.

⁴¹ Because they are ashamed of not being so bright.

⁴² The small man in the eye i.e. the pupil of the eye.

⁴³ It is believed that a man standing before saffron-fields goes on laughing (Viśvakōṣa).

⁴⁴ Text, p. 576.

25, 41, 50, etc. with some *ashrafis*.⁴⁵ The colours preferred for the articles were red or saffron⁴⁶ and rarely green.

Coffee and sherbet were served there, on such auspicious occasions.

The programmes of dancing and music etc. for entertainments continued for days together after the termination of the marriage-date.⁴⁷ Illumination was made by means of candles.

The letters further furnish information on several social customs in vogue during those days :

The *satnasa* rite among the Bania Community was considered to be very important. For its performance, the parents of the woman belonging to Surat called her even from a far place in North India.

The distribution of *pan* (or 'betel) was a very prominent act in the reception of visitors. It was recognised as a sign of closing the interview.⁴⁸ A person could think himself in disgrace or at least slighted if on a first visit, he chanced to be dismissed without a *bira* (or packet) being put into his hand.⁴⁹

This is the reason why in a letter the *Nawwab* of Broach has written from Bombay to Lallubhai, "I wanted to leave the office of the General and so I called for the betel-box twice or thrice and I often said, 'Please, put the *bira* into my hand.' But they were reluctant and did not do so."

People both Hindu and Muslim were extremely addicted to astrological predictions and as such they never set out on any voyage or matter of consequence without having consulted an astrologer.⁵⁰ During those days it was the practice to measure

⁴⁵ Text, p. 547.

⁴⁶ Ibid. p. 527.

⁴⁷ Ibid. p. 524.

⁴⁸ Ibid. pp. 243, 317.

⁴⁹ Ibid. pp. 36, 38.

⁵⁰ Ibid. p. 239.

the time in *gharis*, *palas* and *praharas*; and the *muharrir* was given accordingly.

So when the *Nawwāb* of Broach was to embark for Bombay, the General of that city suggested in his letter that keeping in view the distance of the voyage from Dumas to Māhīm of not less than four days and of the travel on land from fourteen to fifteen days, he should start in such a way that he would reach Bombay on the auspicious day of the *Dastarū*.

The residential places of big personages were called the *haveli*. Rangmahal Kothī in Broach was the place where the *Nawwāb* remained in pomp and attendance. Whenever he appeared in public, he made princely fortunes. Outside the city Mu'azzaz Khān set apart a piece of land; in it he got a beautiful edifice constructed and a big garden prepared with various fruit-trees and flower-plants like quince, mangoes, roses, dog-roses, jasmine, *champa* etc. There he used to hold festivities of singing and dancing.

Cypress-trees and orange-trees did not grow in Broach in those days and the *Nawwāb* was required to procure the plants thereof from Udaipur for his garden.

The *Nawwāb* used to move in palanquins. The English chiefs and factors for whom the *munshi* has often used the word *kulāhpūshan* (or *topiwālās* in Gujarati) used to ride in chariots to which four steeds were yoked. The *begams* never rode male elephants. It was considered to be enormously indecent.

There was the custom of '*nazr*' or '*nazrana*' (or offering) to be made to high superiors at the time of a first interview. Often they were sent to high superiors on some auspicious occasions. It was a present in money from one to five rupees along with one to eleven *ashrafis*.⁵¹ Mostly the present used to be of one *ashraf* and five rupees. The *Nawwāb* often sent

⁵¹ A gold coin; a gold mohar. Its currency is attributed to Al-Malik al-Ashraf, the emperor of Egypt (A.D. 1421-37).

ashrafs in the *nasrāna* to Emperor Shāh 'Ālam and Minister Shujā'ud'-Dawla.

Compilations of the type of the present work occupied prominence in the field of literature during the period of Shah Jahan, Aurangzeb and later Mughals. In the richness of historical materials they offer an almost virgin ground for the study of political, administrative, economic, cultural and social conditions of the period to which they belong. But the scholars should pursue their quest with avidity, assiduity and fervency to make the materials available to the public.

⁶² Text, p. 270.

THREE GYPSY FORMATIVE SUFFIXES

H. C. BHAYANI

University School of Languages
Gujarat University, Ahmedabad-9

1. The diminutive suffix *-ikl-*.

1. Among the MIA and NIA derivatives of Sk. *caṭaka-* (and its bye-form **citaka-*) 'sparrow' noted by Turner,¹ some derive from unextended base, others from extended one. The latter is of several types. There are extensions with *-ll-*, *-ika-* and *-ikka-lla-*. The materials noted for these suffixes are as under :

Extension with *-ll-* :

Bhadrawāhī *caṭōlli* 'any small bird'.

Guj. *callū* 'ibid.'

Bhalesi *ciṛollu*² 'bird'.

Extension with *-ika-* :

Pk. *cidiga* 'bird.'

H. *ciriya* 'ibid.'

Extension with *-ikka-lla-* :

European Gypsy *čiriklo*, *čeriklo* 'bird', *čirikli* 'hen'.

Here Gypsy *čiriklo* / *čer*³ is the sole instance cited for the extension with *-ikka-lla-*.

¹ A Comparative dictionary of Indo-Aryan languages (1964 —), head-word no. 4571.

² cf. Apabhraṃśa *ciḍa-ulla-a-* (Puṣpadanta's *Mahāpurāṇa*, ed. P. L. Vaidya, 1937-41, 9/8/14). The Gujarati words are connected with *caṭaka-*, as against **ciṭaka-*.

2. From the dialect of the Wales Gypsies, Sampson³ has noted the following examples of the suffix *-ā*:-

čavālo, continental Gypsy *čavālo* (also *tachinālo*)
marikā 'cake' (formed from *māro* 'bread').
merikā (from *menri* 'necklace').

3. Now Gypsy is not quite unique in having such formations. Gujarati-Rajasthani shares this peculiarity with it. Corresponding to *čavālo*, it has *caraklo* (m.) (*carakli* f., *caraklū* n.) or *caḍaklo* etc. 'sparrow'.

It occurs in folk songs and in early literature onwards at least from the sixteenth century. For example,

(1) *ame re blūḍā van-ni carakala-di*⁴

'Ah we are the sparrows of the green forest'.
 (Here there is a further extension with *-di*.)

(2) *tī tara tā ahī boli chi caḍakalā tāvā mora*⁵

'Partridges are there;
 sparrows, lapwings and peacocks are crying here.'

(3) *ḥaya-tali ḥāhani rattāḍi, carani caḍakalā-lamka*⁶

'The heels below the feet are reddish; the feet have depression (at the bottom) like a sparrow's feet.'

(4) *te ghara-mā vāhi che carakali*

carakalo beḥe che ḥāsa.⁷

'A hen-sparrow laid eggs in that house. The cock sat by her side.'

³ John Sampson, *The dialect of the Gypsies of Wales* (1926), Part 2, p. 79, §156.

⁴ A line from a popular traditional marriage song.

⁵ *Kādambarī* of Bhālaṇa, ed. K. K. Shastri, Part I (1953), #/20ab (= l. 401). Probable date: first half of the sixteenth century.

⁶ *Mādhavānala-Kāmakandālā-prabandha* of Gaṇapati, ed. M. R. Majumdar, Vol. I (1942), 2/51ab. Its date is 1528 A.D.

⁷ *Parāḷapatti* of Śaṇaḷa, ed. A. S. Patel (1962), 22/64 cd. Its date is 1743 A.D.

4. Moreover we have several other derivatives in *-l-* in Gujarati. For example,

āchakl-ū 'of a frivolous nature' from *āch-ū* 'shallow'.

chamakl-ū 'small fracas' from *cham* onom.

ṭacakl-ū 'electric eel' from *ṭac* onom.

ṭabakl-ū 'a tiny drop' from *ṭab* onom.

marakl-ū 'smile' from *marak-* 'to smile'

tacukl-ū 'stunted, midget' from *tac-ū* 'small'

(as in *tacī āgī* 'little finger')

bacakl-ū 'tiny' from *bacc-ū* 'young one'

sācukl-ū 'truthful' (endearingly) from *sāc-ū* 'truthful'.

Besides these there are numerous cases of *-k-* extended with *-ḍ-*. It is clear that stems extended with *-kka-lla-* are a feature common between Gypsy and Gujarati-Rajasthani. Such kind of commonly shared peculiarities can be of considerable significance for determining linguistic relationships.

2. The adjectival suffix *-un-*.

5. Gypsy *anglun-o*¹⁰ 'first, initial' derives from *angl-*, the base of *angle* 'in front', *anglal*, *aglal*¹¹ 'from in front'. *angle* has the same origin as Pk. *aggale*, Guj. *agaḷ* 'in front', etc., all going back to Sk. *agra-* + *-la-*. *anglun-o* is formed from *angl-* with the suffix *-un-*.

6. Gypsy *anglun-o* at once reminds us of Early Rajasthani *agalūn-o* 'previous, preceding'. An early occurrence can be cited from the famous ballad *Dholā-Mārū rā dūhā* (c. 14th or 15th cent. in its present form):

Jīva dīna ḍholau aṇṇiyau, tīna agalūṇi rāta

*Mārū suhināu lahi kahyau, sakhiyā sū parabhāta*¹²

¹² *Mādhavānala-Kamakandalā* has *marakala-* (5/95) and *ṭaḍakala-* (5/241) 'hot sun'.

¹¹ From Pk. *mur-* 'to bloom'.

¹⁰ Tadeusz Pobożniak, *Grammar of the Lovari dialect* (1964), p. 46, 56.

¹¹ *ibid.*, vocabulary, s.v. *agle*; Turner, *op. cit.*, under entry no. 68.

¹² *Dholā-Mārū rā dūhā*, ed. R. S. Tomar, S. K. Parik, N. D. Svami (1936), st. 501; *Les dūhā de Dholā-Mārū*, ed. Ch. Vaudeville (1962), st. 248.

'In the night that preceded the day Dholā arrived, Mārū had a dream which in the morning she narrated to her companions.'

7. Some other Gypsy derivatives in *-un-* are as under :

Lovari¹³ *somnakuno* from *somnakaj* 'gold'.

Lovari *rupuno* from *rup* 'silver'.

8. Again Early Gujarati-Rajasthani too has several such derivatives. For example *ajūnāū*¹⁴ (*ajūnā*, etc.) 'of to-day' from *aja* 'to-day'. *kālūnāū* (*kālūnāu*, etc.) 'of tomorrow' from *kāla* 'tomorrow'. *paramūnāū* 'of two days hence' from *parama* 'further'. *ajūnai* occurs also in *Dholā-Mārū rā Dahā* (st. 530); the Modern Marwari form is *ajūno*. We can go even beyond Early Gujarati-Rajasthani and cite one instance of this type of derivative from an unpublished Apabhraṃśa work (viz., Svayambhū's *Riṭhānemicariu*) composed in c. 9th cent. At 50/1/4 of the *Riṭhānemicariu* we find the expression *ajjōnau vāsaru* 'this day'.

Thus the adjectival suffix *-ona/-ūn-* has been in use since ninth century in Apabhraṃśa and Gujarati-Rajasthani linguistic tradition. And on this point also Gypsy shows its affinity with Gujarati-Rajasthani.

3. The possessive suffix *-an-*.

9. The stem of Gypsy *roman-i* 'the Gypsy language', *roman-o* 'Gypsy' is made up of *rom* (<Sk. *roma*, *ṛomba*)+ suffix *-an-*. This suffix is still productive in the Lovari dialect which has¹⁵ *balano* 'pork' (from *balō* 'pig') and *guruvano* 'beef' (from *guruv* 'ox').

¹³ Grammar of the Lovari dialect, p. 50.

¹⁴ These forms are cited from *Prācīn Gujarātī gadya samdarbh*, ed. Muni Jinavijay (1930), p. 180, 184; they are also found in *uktiratnākara* of Sādhv-sundara, ed. Muni Jinavijay (1957), p. 27, 56, 62. See also *Dholā-Mārū ke katipay sthālō ki arth-carcā tathā śabda-carcā*, H. C. Bhayani, *Varāḍa* 6, 3 (1963), note no. 72; 7, 1 (1964), note no. 74.

¹⁵ Grammar of the Lovari dialect, p. 50.

10. This suffix is of the same origin as the NIA suffix *-āna-*¹⁶ 'forming possessive adjectives from proper and common nouns and from pronominal genitives or possessive adjectives' used as stems. It is attested moreover in its Sanskrit form *-ānaka-* by numerous names of villages of the Maithaka period (e.g. *Puryānaka-*, *Saṃgamānaka-*, *Rohānaka-*, *Bhadrānaka-*, *Saṃlatta-bhājānaka-* etc.). As *-ān-*, it is conserved in the modern village or regional names predominantly confined to the West and North (i.e. the area of Gujarat, Rajasthan, Sindh, Panjab etc.). Of course the exact regional distribution and degrees of concentration of *-āna-* ending place names are matters for further investigation. It may be noted in passing that the name *Rājputānā* for Rajasthan is made up of *Rājput* + *-ānā*.

These facts about the occurrence of the suffix *-āna-*/*-ān-* supply us with some further important clue as to in which direction we should look for fixing up a closer linguistic affinity for the Gypsy language.

11. While definitely establishing the connection of the Gypsy language with the Central Group of NIA languages now comprising Rajasthani, Hindi, Central and Eastern Pahari, etc., Turner observes that 'as to the exact connections of Romani within the Central Group it is impossible to be more explicit.'¹⁷ He further adds that 'all that can be said with certainty is that Romani belonged to the Central Group which excluded the ancestors of Sinhalese, Marathi, Sindhi, Lahanda, Panjabi, Dardic and West Pahari and probably Gujarati and Bengali.'

In the light of the affinities of the three characteristic suffixes discussed here (and numerous other commonly shared

¹⁶ For detailed documentation and discussion in support of establishing a suffix *-āna-* see H. C. Bhayani, 'The Late Middle Indo-Aryan suffix *-āna-*', *The Adyar Library Bulletin*, 25, 1-4 (1963), p. 313-320; also, Bhayani, *Anuśilano* (1965), p. 196-202. For Pali derivatives in *-āna-* (e.g. *gīṭhāna-*, *vassāna* etc.), see H. Lüders, *Philologica Indica* (1940), p. 403-c.

¹⁷ R. L. Turner, *The Position of Romani in Indo-Aryan* (Gypsy Lore Society Monograph No. 4) (1927), §63.

significant conservations), it seems that the above-stated conclusion of Turner's shall have to be modified — so far as Rajasthani and Gujarati are concerned. Some of the common conservations seem to be distinctive and we are required to assume a closer affinity between Gypsy and the ancestors of Marwari and Gujarati or what Tessitori termed Old Western Rajasthani. Of course a more positive statement on this point has to await a systematic comparison of the relevant linguistic data.

CHANDRA BHĀN BRAHMAN—LIFE AND WORKS—Contd.

DR. M. A. H. FAROCQUI

*Head of the Dept. of Persian, Urdu and Islamic Culture,
Gujarat College, Ahmedabad*

Works of Brahman

In the preface to his *Munsh'āt*, Brahman enumerates his works as follows :

- I. The Persian *Diwan*, consisting of *ghazals*, *rubā'is* and *masnawīs*
- II. *Guldestā*.
- III. *Chahūr Chaman*.
- IV. *Tuhfatul Wuzarā*.
- V. *Kārnāma*.
- VI. *Tuhfatul-Fuṣahā*.
- VII. *Majma'u'l Fugara*.

To this may be added the following :

- VIII. *Munsh'at-e-Brahman*;
- IX. *Ruq'āt-e-Brahman*;⁵¹ and
- X. *Inshā-e Haft-Gulshan*;⁵²

all comprising of Brahman's letters, etc.

Brahman is also credited to have translated a Sanskrit work *Ātma Bilās*, into Persian, under the title *Nāzūk Khiyālāt*.⁵³ He also translated, from Hindi into Persian, the famous religious discourse that took place between Dārā and the Hindu ascetic Bābā Lāl Dās, at the residence of Brahman, and named it

⁵¹ A copy of the MS. is preserved in the Pīr Muḥammad Shāh Library, Ahmedabad.

⁵² A copy of the MS. is preserved in the Library of Gujarat Vidyā Sabbā, Ahmedabad, No. 206.

⁵³ *Adabiyāt-i-Fārsī-men—Hinduon-kā-Ḥiṣṣa*, p. 75.

Mukalimāt-i-Dārā Shikuh wa Babā Lāl.⁵⁴ An Urdu translation of this work entitled *Asrar-i-M'arifat* was published by Diwān Māyā Dās of Lahore and another, with Persian text entitled *Shu'ā-i-M'arifat* was published by Munshī Bulākī Dās of Delhi in 1896 A.D.⁵⁵ The Persian translation by Brahman has been appreciated by several scholars, as he has acquitted himself creditably of the task.

Brahman's fame rests chiefly on his *Chahār Chaman*, the *Munsh'at* and the *Diwan*, his other works being extremely rare and almost extinct. I, therefore, propose to deal only with these works in detail.

I. Chahār Chaman

According to Rieu the work appears to have been written shortly after 1057 A.H./1647 A.D., as the restitution of Balkh to Nazr Muḥammad Khān, which took place at that date, is mentioned as a recent transaction.⁵⁶ It is divided into four *Chamans*. The first contains descriptions of various festivals at the Royal Court with Brahman's verses as recited by himself on these occasions.

The Second *Chaman* contains a prolix description of the daily occupations of Shāh Jahān, of his exalted qualities and of the splendours of his court, his new capital Shāh Jahānābād and the principal cities and ṣubās of the Empire.

The third *Chaman* contains a brief biography of the author and some letters mostly found in the *Munsh'at*.

The fourth *Chaman* deals with the moral, ethical and mystical thoughts of the author.

Although the *Chahār Chaman* comes under the form of *inshā*, its historical value, none the less, is significant. In his dispatches from Udaipur, where he was sent on a diplomatic mission, Brahman has given a graphic account of the entire event from beginning to end. Here, he has recorded the

⁵⁴ *Majma-ul-Baharain*, p. 24.

⁵⁵ *Ibid.* p. 25 f.n.

⁵⁶ Rieu, p. 838b.

smallest detail of the eventful mission, describing the climate, the people, and the fruits and vegetables grown in that region. Moreover, he has observed, faithfully, the essential requirements of a good chronicler and has recorded the events truthfully, without prejudice and partiality, avoiding sectarian bitterness or religious bigotry.

The style of the author, as usual, is simple, though occasionally he indulges in grand phraseologies. But such isolated examples, besides proving him as a successful imitator of ornate style, reveal his command over the language. The well-knit sentences, the choice of refined and elegant words, the homely similes and metaphors, all go to prove that Brahman is more a litterateur than a historian.

The *Chahār Chaman* has enjoyed considerable fame and popularity amongst the Persian knowing readers and biographers both during the life time of its author as well as in the later period of the Mughal rule in India. Lachhmi Nārāyān Shafiq says that in his time the *Chahār Chaman* and the *Munsh'āt* were included in the curriculum of Persian studies as text-books.⁶⁷ Sir J. N. Sarkār, Dr. B. R. Saksenā and several other historians have availed themselves of the *Chahār Chaman* as sources in their historical works.

II. *Munsh'āt-i-Brahman*

The *Munsh'āt* is a collection of Brahman's letters. These letters have quite a range of varieties as they are addressed to persons belonging to almost all walks of life — kings, ministers, nobles, generals, statesmen, poets, writers, savants, friends, relatives — irrespective of their caste, creed and religion. In these letters Brahman reveals his character and personality in a most pleasing manner.

The *Munsh'āt* is divided into five sections, each consisting of letters addressed to a particular class of men. In almost all these letters, Brahman records his freshly composed *ghazals* inviting critical appreciation of his poetry.

⁶⁷ *Gul-i-Ra'nā*, p. 12.

A good letter is a good companion of seclusion and solitude. It is often described as *nisf muṭāqāt* — partial meeting, of a distant friend, in absentia. Brahman believed that making sincere communications and reading loving letters, is like enjoying spiritual conversation, as he writes in one of his letters :

”ورود مفاوضات بکرنکی و مطالع (کذا) مراسلات یکجہتی
را مکاتہ روحانی گفته اند.....“⁶⁸

Only a casual reading of his letters will convince the reader that Brahman has adhered to this adage and has made his letters a refreshing spiritual communication and a bliss of solitude.

The most striking feature of these letters is the use of brief and short forms of addresses. Abu'l Fazl and his followers have invariably used long and elaborate forms in their letters, some of which run for several lines. There is hardly an epithet in the Persian vocabulary which they have spared in their correspondence. But Brahman has revolted against this tendency. The immortal Ghālib is known for his brief, charming and novel forms of addresses in his letters; but what Ghālib did in the first half of the 19th century, Brahman practised two centuries earlier. He is astonishingly brief in addressing the recipients of his letters. Be he a king or a commoner, Brahman adheres to this principle without distinction, and it is astounding to see him address even Emperor Aurangzib with this brief form :

پادشاہ ، کریم ، رحیم ، عادل ، مہربان سلامت

That there is charm and refreshing candour in these forms cannot be gainsaid and the modern mind is at once attracted by these simple and homely forms. Many a time Brahman does not use any form of address but begins his letter directly with a verse or a prayer.

Besides being simple and brief in their forms of addresses, the letters are direct and to the point. They are written in a lucid and charming style—an open revolt against the age-old traditional ornate and pedantic style, originated by Qāzi

⁶⁸ Munsh'āt, G : Folio 73.

Ḥamidu'd-din, encouraged by Waṣ-ṣāf and Kāshifī and so faithfully followed by Abu'l Faẓl, 'Abdul Bāqī Nahāwandī and even imitated by Brahman's own contemporaries. At a time when lucidity was very often misconstrued as lack of scholarship, merit and even dignity, Brahman had the courage to adopt such simple style.

Brevity is the key-note of these letters. By nature Brahman loved simplicity. By temperament he disliked verbosity. Elaboration and hyperbole he detested, and tasteless bombast he scrupulously avoided. Lodi and Sirkush have praised Brahman's style while Dārā was enamoured of it.

Most of the sentences of Brahman are short and pointed and, as some critics have rightly observed, they remind us of Sa'dī's *Gulistān*. For example :

شب بخيال شما روزی شود و روز (به) تصور شما شب می رسد -

The night is turned into day, thinking about you and the day is turned into night imagining you.

علم بی عمل شاخ بی بر بود، علم قلیل با عمل بهتر از علم
کثیر بی عمل -

Knowledge without practice is fruitless branch; little knowledge with action is better than abundance of knowledge without deed.

هرچند کمتر یاد می فرمایند بیشتر یاد می آیند -

The less you remember me the more I am reminded of you.

Sometimes, however, in the *Munsh'at* too, Brahman indulges in grand phrasologies. The letter addressed to Nāmdār Khān⁵⁹ may be cited as an example for those who love the bombast of the epistolary works and *belles lettres*, produced and written in India. Likewise in most of the letters addressed to his relatives, Brahman appears to have adopted a style different from his own. We may trace in them some influence of ornate style.

⁵⁹ *Munsh'at*, G. : Folio 15b.

As already observed, the letters of the *Munsh'at* throw a good deal of light on the literary and cultural activities of the times of Brahman. Even during the life time of the author the *Munsh'at* had achieved fame far beyond the frontiers of India and his writings had earned distinction even in Iran and Turan⁶⁰.

III. The Dīwān

We have seen above that Brahman's style in Persian prose is of a high order. However his fame, by far, rests on his Persian *Dīwān*—the collection of his odes, quatrains and *masnawts*. He appears to have enjoyed poetic fame even during his life time. His verses and the specimens of his *shikasta* style were carried to Iran by Jān Nisīr Khān, an Indian envoy, at the instance of Sa'dulla Khān, and the following two couplets had attained popularity in that land.⁶¹

باید بداغهای نمک سود زیستن
بودن تمام آتش و بی دود زیستن

One should (learn to) live with burning wounds;
Be all fire and emit no smoke.

چشم تا برهم زدی انجام شد آغاز عمر
طی شد آن ره آنچنان کارا ز پائی برنخاست

With a twinkle, life ended;
The journey (of life) was traversed in perfect silence.

That Brahman was conscious of his poetic fame to distant Iran, is also evident from the following verses:

بایران می برد افسانه هندوستان بلبل
برهمین را شکر افشائی ار باشد همین باشد

The nightingale carries fame of India to Iran;
This is proof positive of Brahman's elegant pen.

⁶⁰ *Chahār Chaman* : Folio 154.

⁶¹ *Toḥfatu'l-Fuṣṣah* as quoted by Sunnāmī, p. 145.

شرف بر خسته ایران زمین هندوستان دارد
که شاه عصر چون من طوطی شکر نشان دارد

India enjoys superiority over Iran

Inasmuch as the Emperor (Shāh Jahān) has a sweet-singing parrot like mine.

Brahman's *ghazals*, as a rule, consist of only five couplets. The poet, by temperament, preferred brevity both in prose and poetry and that in all probability he made it a rule to compose *ghazals* consisting of five or six couplets only. However, it is gratifying to note that the result of restricting the number of couplets, is wonderfully pleasing.

The *Diwān* appears to have been compiled by Brahman after his retirement, as many of the *ghazals* composed during that period are included in it. This is further corroborated by a remark made at the end of the autographed MS. of the *Diwān*, saying that it was compiled during 'the reign of Aurangzīb':

“در عهد دولت بادشاه عالمگیر آفاقستان”⁶¹

A Critical Appreciation of Brahman's Odes

Many biographers have not thought it worthwhile to include Brahman in their works. This indifference, whether calculated or otherwise, is deplorable. But there are exceptions. Ṣāliḥ, Lodi, Sarkhush, Shafiq and Mullā Munir have paid glowing tributes to the poet's artistic genius. Ṣā'ib, the great master of Persian lyric and a contemporary of Brahman, has paid the greatest compliment to Brahman's poetry by including some selected verses, in his famous *bayaz*—a personal anthology of Persian verses.⁶² Nevertheless most of the modern writers have realised the injustice done to Brahman and have paid compliments to his literary and poetical achievements by placing

⁶¹ Sunnāmī: 148.

⁶² *Adabiyat-i-Fārsi-men-Hinduan-ka-Hisāb*, p. 82.

him on par with his celebrated contemporaries. They include Maulānā Ḥasrat Mohāni, Dr. Sayyid 'Abdulla, Mr. Muḥammad Ikram and several others.

The most striking feature of Brahman's *ghazals*, is graceful simplicity. Wordsworth, we are told, held that the common language of common men was best suited to express the passions which find vent in poetry. Brahman does not indulge in staggering hyperbole or resounding similes. Subtle ideas are expressed in simple and graceful style. Even when he expresses mystical pantheistic ideas, he, like many other poets, does not mince matter or practise jugglery. Being primarily a lyricist, subjectivity is the essence of his poetry. Elegant and polished diction, general ease, natural expression and scintillating pathos are the hall marks of his lyrics.

Individuality :

The graceful ease of Brahman's style has given him a distinct individuality of his own as against the laboured and affected style of the most of his contemporaries. The study of Brahman's poetry and that of his fellow-poets, is a study in contrast. He is more sensitive, more sincere and more himself than many of them. His verses are the voice of his own mind. His own way of thinking and expressing, his gentle tone and temperament, his charming simplicity and his skill of versification, his love of truth and frankness, his spontaneity and sincerity of utterances, the use of particular words and phrases, his mystical leanings and above all his fellow feeling, all contribute in unfolding his personality and giving him a unique individuality.

A Didactic Poet :

Like Sa'dī who seems to have influenced him immensely, Brahman is essentially a didactic poet. The sensuous element is conspicuously absent in his odes. He talks of contentment, *fiqr*, magnanimity, humility and many other qualities of human conduct, but nowhere does he assume the tone or the rôle of

a preacher or a surmoniser, as the following couplets show :

ما معتقد همت صاحب نظرانیم کونین بود مختصر اندر نظر ما

We have faith in the magnanimity of men of sight,
The universe is insignificant in our eyes.

راه تواند کسی بر مردم آزاد بست

هیچ کس تواند آری ره بروی باد بست

None can fetter a sublime soul,
Truly, none can fetter breeze.

ما مرغ سدره ایم برهن که در طریق

در بند آب و دانه دام و قفس نه ایم

We are the birds of *Sidra*,⁶⁴
We do not run after opulence on the Path.

سیراب باد گلشن همت که برهن

لب تشنه، جام برب کوثر شکسته ای⁶⁵

May the garden of magnanimity blossom,
Brahman, in spite of parched lips,
Broke the cup at the fountain of *Kausar*.⁶⁶

دران دیار که هر صبح خون کنند بجام

جین شگفته تر از آفتاب می باید

In the land where every morn the cup is filled with blood,
Be more cheerful and brighter than the sun.

ما برهن مشکلات روزگار آسان کنیم

هر چه مشکل تر بود آثار آسانی دروست

Oh Brahman! we take lightly, the vicissitudes of time,
The more difficult a task, the more easy it is.

⁶⁴ The Lote-tree in the seventh heaven, supposed to be the abode of angel Gabriel.

⁶⁵ c.f. Iqbal :

گدای میکده کی شان بے نیازی دیکم پنہج کے چشمہ حیوان پہ توڑتا ہے سب

⁶⁶ A river in Paradise.

These verses awaken us to stark realities of life and equip us with courage and determination to face them squarely. They are not 'the product of the heat of the moment but rather the crystallization of the experience after the experience is past.'

Erotic :

Not that Brahman's poetry is purely didactic. Lyrical poetry is and should be primarily erotic, and his verses are full of lyrical fervour, vigour and poignancy.

The following verses illustrate these points :

تا سر زلف او بدست آرد دل پریشان تر از صبا شده است

In order to lay hold on the locks of the beloved,
The heart is more distracted than the zephyr.

اضطراب دوجہان را شمارد بجوی
هرکرا در شکن زلف تو آرامی هست

He who reposes in the ringlets of your locks,
Cares a straw for the vicissitudes of time.

حرام باد ترا امتحان لذت عشق
اگر ز درد محبت بری بدرمان دست

Fy! If through the ordeal of love,
You seek remedy for the pangs of love.

افروخته بودیم شب از گریہ چراغی
اما خبر از روغن ما کس نگرفته ست

Last night we lighted the lamp with (the oil of) tears,
But alas! none knew of the oil (blood).

آن آتش نهفته کہ درسینہ داشتم
چندان بلند شد کہ دل آفتاب سوخت⁶⁷

The hidden flame of my heart
Grew so lofty that it burnt the very sun.

⁶⁷ c.f. Hāfiḡ :

بکشای تربتم را بعد از وفات و بنگر
کو آتش درونم دود از کفن برآید

روی او شب بخواب می دیدم تا سحر آفتاب می دیدم

Last night I dreamt of the beauty (of the beloved),
And lo! till dawn I enjoyed (the effulgence of) the sun.

The reader of Brahman is at once impressed by the poet's novel similes, metaphors and fanciful reasons for describing persons or things. They all point out to Brahman's genius for using such figures in a masterly manner. The following verses, illustrate suggestive similes and meaningful metaphors:

کردن کشان که باد غرورند در دماغ چون دانه اند در ته این کهنه آسیا

The vain, disdainful persons are
Like grain under the old mill-stone (the sky).

هرگز نمی فتد بزمین طفل اشک من مانند موج، دامن دریا گرفته است

My tiny tears never fall on the ground,
Like wave, they are wedded to the sea (tearful eyes).

بر قامتش نظر مکن و بر کنار باش زین آتش بلند که بالا گرفته است

Do not look at her stature! Beware!
It is a flame, high and lofty.

بچشم اهل خرد، مرد از هنر خالی بود چو شاخ خزان دیده، از ثمر خالی

In the eyes of the prudent, an artless person
Is like the autumn tree bereft of fruit.

The following are the examples of *husn-i-ta'îl*—poetical aetiology—a figure in which the poet assigns fanciful reason for the description of a person or a thing:

تا پیچ و تاب زلف تو داریم در خیال صد جا زهم گسسته بود گفتگوی ما

The image of the curls and twists of your locks
is haunting our minds,
Our talk, likewise, is incoherent and rambling.

هرچند ابر گریه کند بشکند چمن
از فیض آب دیده بود آبروی ما

When the cloud rains the garden blossoms,
So is the lustre of our face on account of the raining tears.

بسکه طبع شکفته ای داریم لا جرم همچو گل پریشانیم

We have extremely cheerful disposition,
Consequently, like rose, we are distracted.

The following are the examples of *Miṣālīyya*—aptness of illustration—a favourite figure with Kalīm and Ṣā'ib :

لب لعل بتان اصل علاج درد ما باشد
منی رنگین نشاط افزا بود طبع حزینی را

The ruby lips of the beauties are sure remedy for our pain,
Surely, the colourful wine cheers up the morose mind,

با عشق زود رس چه کند عقل دورین
با آفتاب حاجت نور چراغ نیست

What can the farseeing intellect do against precocious love!
With sun light, what need there be of lamp!

Quatrains :

Brahman, like all other poets, has composed quatrains also, which as a rule, speak of spiritual Love; Divine Decree; futility of ambition, etc. These quatrains are full of vigour and fervour. In them, as Maulānā Ḥasrat Mohānī has rightly observed, we trace the influence of Khayyām.

Maṣnawīs :

Brahman has composed several brief didactic *maṣnawīs* on his favourite themes like Prayer; Divine Love; erring Adolescence, etc. Generally there is not much substance in these poems but they are full of vigour and ardour and in them the pen of the poet is more brisk than in the *ghazals*.

Brahman and Urdu :

According to Pandit Kaifi, Brahman used to compose verses in Urdu too.⁶⁸ He has quoted a *ghazal* opening with the following couplet, in support of his contention :

خدا جانے یہ (کذا) کس شہر اندر من کو لائے ڈالا ہے
نہ دلبر ہے نہ ساقی ہے نہ شیشہ ہے نہ پیالا ہے

Pandit Kaifi further opines that this is the oldest *ghazal* so far traced in Urdu poetry.⁶⁹ However, I, very humbly submit that he has based his conclusion on mere surmises. There are no adequate internal or external evidences to deduce that Brahman composed verses in Urdu too. If he did, he would have gladly made a mention of it somewhere in his writings. The authenticity of the statement made by Panditji has been doubted by several writers. I am, therefore, averse to believe that Brahman ever composed in Urdu.

This brings me to another very important point which I would like to mention here, before I conclude. Many Iranian poets residing in India, during the Mughal rule, have freely used Hindi words in their compositions. But it is surprising to note that in spite of his being well versed in Hindi, Brahman has scrupulously avoided use of Hindi words in his verses, so much so that in the whole of his *Dīwān*, he has used only one Hindi word *lāj* :

فتہ و ناز و بلا آرند خوبان برہمن
در محبت ہرچہ پیش آرند، اینجا لاج نیست .

⁶⁸ Kaifiyya, p. 24-25.

⁶⁹ Ibid. p. 59.

BIBLIOGRAPHY

English

1. 'Abdu'l-Qādir Sarfrāz — Prof. Shaikh :
A Descriptive Catalogue of Arabic, Persian and Urdu MSS. in the Library of the University of Bombay, 1935.
2. Beale-William :
Oriental Biographical Dictionary — Edited by the Asiatic Society of Bengal, Calcutta, 1881.
3. Ethe-Herman :
A Catalogue of Persian MSS. in the Library of India Office.
4. Maḥfūz'ul-Haq-M. :
Majma-'u'l-Baḥrain—Asiatic Society of Bengal, Calcutta, 1929.
5. Qanūngo K. R. :
Dārā Shikoh—1953, 2nd Edition.
6. Rieu-Charles :
A Catalogue of the Persian MSS. in the British Museum (Rieu).
7. Sarkār-Jadunāth :
Mughal Administration.

Persian

8. Baizā'i H. Partau :
Diwān-i-Kalīm Kāshānī — Tehran, 1336, *Shamsi*.
9. Ghulām Muḥammad-Maulānā :
Tazkira-i-Khushnawīsān.
10. Lodi-Amīr Shīr 'Alī Khān :
Tazkira-i-Mir'āt'ul-Khiyāl, Bombay.
11. Shafiq-Lachhmī Nārāyan :
Gul-i-Ra'nā, Hyderabad.
12. Šālīḥ-Muḥammad :
'Amal-i-Šālīḥ—Calcutta, 1939.

Urdu

13. 'Abdu'lla—Dr. Sayyid :
Adabiyāt-i-Fārsī-men-Hinduon-kā-Ḥiṣṣa—Delhi, 1942.
14. Bahār Sunnāmī-Bhagwat Rāi :
Gulzār-i-Bahār ma'ruf ba Bazm-i-Nazm-i-Brahman, Delhi.
15. Kaifi-Brij Mohan Dattātriya, Pandit :
Kaifiyya—Delhi, 1942.

MS.

16. Brahman—Chandra Bhān :

- (i) Chahār Chaman-i-Brahman:
Photostat copy of the MS. preserved in the Rīzā Library,
Rampur.
- (ii) Munsh'āt-i-Brahman R. : Photostat of the MS. of the above
Library.
- (iii) Munsh'āt-i-Brahman G. : MS. copy belonging to Maulānā Ḥabibur-
Raḥmān Ghaznawī of Ahmedabad.
- (iv) Diwān-i-Brahman : Photostat copy of the MS. of Rīzā Library,
Rampur.
- (v) Diwān-i-Brahman : Photostat copy of the MS. of the Sālār Jung
National Museum and Library, Hyderabad.
- (vi) Diwān-i-Brahman : MS. copy of the Library of the University
of Bombay.
- (vii) Raq'āt-i-Brahman : MS. copy of the Pir Muḥammad Shāh Library,
Ahmedabad.
- (viii) Inshā-i-Haft Gulshan : MS. copy of the Library of Gujarat
Vidyā Sabhā, Ahmedabad.

‘પ્રેમાનંદ’નાં નાટકોને ‘આખ્યાન’ નામ શા માટે ?

[એક નોંધ]

જમદીશ જ. ૬૯

૩૩૧૬૩

ભાષા-સાહિત્ય ભવન

ગુજરાત યુનિવર્સિટી, અમદાવાદ-૬

પ્રેમાનંદના નામે ચડેલાં ત્રણ નાટકો ‘રોષદર્શિકાસત્યભામાખ્યાન’, ‘પાંચાલીપ્રસન્નાખ્યાન’ અને ‘તપત્યાખ્યાન’, પ્રેમાનંદે લખેલાં નથી એ, એની ચર્ચા સ્વ. ઇ. સ. દેસાઈથી આરંભાઈ અનેક વિદ્વાનો દ્વારા આગળ ચલાવાઈ સ્વ. ન. ભો. દિવેટિયાએ અતિ વ્યવસ્થિત રીતે એ નાટકો પ્રેમાનંદનાં નથી એમ સાબિત કર્યા પછી તથા એ ચર્ચાનો ઉચિત રીતે સંજોગોમાં સમારોપ ડો. પ્રસન્ન વક્રીલે પોતાના મહાનિબંધ ‘કવિ પ્રેમાનંદની સંદિગ્ધ કૃતિઓ’માં કર્યા પછી, સિદ્ધ થઈ ચૂકેલી હકીકત છે. એ નાટકોના કર્તૃત્વની ચિંતા કર્યા વગર એનું સાહિત્યિક મૂલ્યાંકન પણ સ્વીકૃત મહાનિબંધની કક્ષાએ થઈ ચૂક્યું છે. ‘આખ્યાન’ શબ્દનો ઉપયોગ મધ્યકાલીન સાહિત્યમાં એક વિશિષ્ટ કાવ્યપ્રકારાર્થે સ્થિર રૂપે કરાતો હોવા છતાં એ નાટ્યત્રયી પાછળ ‘આખ્યાન’ શબ્દ કેમ લગાડાયો તેનો ખુલાસો, પ્રથમ તો ‘કાવ્યમાલા’કારે જ ‘રોષદર્શિકાસત્યભામાખ્યાન’(જે નાટ્યત્રયીમાં સૌપ્રથમ પ્રગટ થયું)’ની પ્રસ્તાવના ‘અંશવિવેચન’માં તે અંગે પ્રશ્ન ઉઠાવી, કૃતિમાં કવિએ જ એનું નિરાકરણ નાટકની પ્રસ્તાવનામાં કરી દીધું છે એવો ઉલ્લેખ કરી, કર્યો છે તથા નાટકમાં પારિપાશ્વક દ્વારા આ પ્રશ્ન જોમો કરાવી સૂત્રધારમુખે ‘નાટકને સ્થળે કોઈ પણ પ્રાકૃત ભાષામાં આખ્યાન શબ્દ યોજવો’^૧ આ શબ્દો મૂકી હેમાચાર્યના ‘પ્રાકૃત પ્રભાકર’નો હવાલો આપ્યો છે. એટલે કે ‘આખ્યાન’ નામની ચર્ચા અંગે કર્તાઓએ પોતાના પક્ષે પૂર્ણ વિરામ મૂકી દીધું છે. પણ સ્વ. દિવેટિયાએ ‘કવિ પ્રેમાનંદનાં નાટકો’માં એ અંગે ચર્ચા કરતાં ‘પ્રાકૃત પ્રભાકર’ની હસ્તિ માટે જ સંદેહ દર્શાવ્યો હોઈ ૨ ‘આખ્યાન’ નામ અંગેનો પ્રશ્ન પાછો જોમો જ રહે છે. આથી, આ નાટકોને ‘આખ્યાન’ નામ આપવા પાછળ કોઈ કારણનું આરોપણ કરી શકાય છે કે કેમ તેની એક શક્યતાને વિચારવા પૂરતો જ આ નોંધનો ઉદ્દેશ છે.

૧. મરાઠી નાટકોનો ઇતિહાસ તપાસતાં આવી એક શક્યતા નજરે ચડે છે. સાંગલીના રાજા શી. ચિંતામણીરાવ અપ્પાસાહેબ પટવર્ધને સાંગલીમાં ઈ. સ. ૧૮૪૨માં કર્ણાટકના ઉત્તર કાનડા પ્રાંતમાંથી આવેલી ભાગવત મંડળીના બેત્રણ પ્રયોગો જોયા. એની ગ્રામ્યતાથી ત્રાસી જઈ પોતાના આશ્રિત એવા વિષ્ણુદાસ ભાવેને એમાં સુધારો કરી નવા પ્રયોગો કરી શકાય કે કેમ એ વિશે પૂછતાં વિષ્ણુદાસે હા પાડી, અને ૧૮૪૩માં ‘સીતાસ્વયંવરાખ્યાન’ રાજદરબારમાં ભજવી બતાવ્યું. ત્યાર પછી ‘એક વર્ષમાં જ રામાયણમાંથી જ દસ

^૧ ‘રોષદર્શિકાસત્યભામાખ્યાન’ : સં. હ. દ્વા. કાંટાવાળા અને ના. પૂ. શાસ્ત્રી, આવૃત્તિ ૨૭, સન ૧૯૧૧, પૃ. ૧૪.

^૨ ‘કવિ પ્રેમાનંદનાં નાટકો’ (ઈ. સ. ૧૯૧૦) : ન. ભો. દિવેટિયા, પૃ. ૪.

નાટકો તૈયાર કરીને તેના પ્રયોગો શ્રીમંતને બતાવ્યા' એમ વિષ્ણુદાસ પોતે પોતાની હયાતીમાં ઈ. સ. ૧૮૫૫માં બહાર પાડેલા 'નાટ્યકવિતાસંગ્રહ'ની પ્રસ્તાવનામાં નોંધે છે.^૩ એ પુસ્તકની અનુક્રમણિકા જેમાં 'આખ્યાન' નામ ધરાવતાં નાંચે મુજબનાં નાટકો મળ્યા આવે છે :

મથુપતિજન્મઆખ્યાન
રામજન્મઆખ્યાન
તાટકાવધ આખ્યાન
સીતારવયવરાઆખ્યાન
ભાર્ગવગર્ભોચનાઆખ્યાન
ખરદૂધપણુવધાઆખ્યાન
રામવિરહઆખ્યાન
શકિતહતલક્ષ્મણુઆખ્યાન
લવકુશઆખ્યાન
પારિજાતકાઆખ્યાન
કચ-દેવયાની આખ્યાન
યમાતી આખ્યાન
ચક્રચૂડાખ્યાન વગેરે.

૨. ઇતિહાસસંશોધક શ્રી. વિ. કા. રાજવાડેએ વિષ્ણુદાસનાં નાટકોથી પણ જૂનાં એવાં, તંબવરના બોસલે કુળના રાજ્યોએ લખેલાં નાટકોમાંથી એક નાટક, નામે 'લક્ષ્મી-નારાયણકલ્યાણ', તંબવરના રામદાસી મઠમાંથી મેળવ્યું અને તેનું સંપાદન કરી 'અંશમાલા' માસિકમાં પ્રગટ કર્યું હતું, એવો ઉલ્લેખ શ્રી. બનહટ્ટી કરે છે.^૪ આ નાટક લખાયાની સાલ શ્રી. બનહટ્ટીએ આપી નથી પણ શ્રી વિ. કા. સાહે શ્રી. રાજવાડેનો હવાલો આપીને ઈ. સ. ૧૬૮૨ આપે છે.^૫ એને આખ્યાનનું નામ અપાયું નથી. બોસલે કુળના રાજ્યોએ અન્ય નાટકો લખ્યાં હોવાનું પણ ડૉ. લેલે 'યક્ષગાન-ભાગવત નાટક'માં નોંધે છે તથા પોતાના પુસ્તકમાં એમાંના એક નાટક 'શ્રીમહાલક્ષ્મીબહેનીસંવાદ'નો મોટો ભાગ ઉદ્ધૃત પણ કર્યો છે.^૬ અહીં પણ નાટકના નામ પાછળ 'સંવાદ' લખાયું છે; 'આખ્યાન' કે 'નાટક' નહિ.

૩. ઉપરની બંને હકીકતો જેમાં જણાય છે કે ૧૬મી સદીની મધ્યમાં રચાયેલાં વિષ્ણુદાસનાં નાટકોને જ 'આખ્યાન' નામ પ્રાપ્ત થયું છે. તત્પૂર્વેનાં પ્રાપ્ત થયેલાં બોસલેનાં નાટકોને નહિ.

૪. શ્રી. રાજવાડેએ 'અંશમાલા'માં પ્રસિદ્ધ કરેલા બેખની સાલ શ્રી. બનહટ્ટીએ આપી નથી પણ ડૉ. લેલેનું પુસ્તક પ્રકાશિત થયું તેના ૨૫-૩૦ વર્ષ પહેલાં રાજવાડેએ

^૩ નાટ્યકવિતાસંગ્રહ (ઈ. સ. ૧૮૫૫) : વિષ્ણુદાસ ભાવે, પ્રસ્તાવના, પૃ. ૬.

^૪ મરાઠી રંગભૂમિના ઇતિહાસ (ઈ. સ. ૧૯૫૭) : લંક ૧લા, શ્રી. ના. બનહટ્ટી, પૃ. ૩૨.

^૫ મરાઠી નાટ્યકથા (ઈ. સ. ૧૯૪૦) : વિ. કા. સાહે, પૃ. ૨૮૮.

^૬ મરાઠી રંગભૂમિના ઇતિહાસ : લં. ૧લા, ભાગ ૧લા : યક્ષગાન — ભાગવત નાટક (ઈ. સ. ૧૯૪૩) : ડૉ. લેલે.

લેખ લખાયાનું તેમણે નોંધ્યું છે. એટલે કે, તાંબવરીય નાટકોના ‘અસ્તિત્વની પ્રથમ પ્રસિદ્ધિ, ડૉ. મેલેનું પુસ્તક ૧૯૪૩ માં પ્રસિદ્ધ થયું તે જોતાં, આશરે ઈ. સ. ૧૯૨૦ની આસપાસમાં થઈ હોય એવું છે.

૫. એટલે, ‘પ્રાચીન કાવ્યમાલા’ કારણે આ નાટ્યત્રયી લખી તે કાળમાં તાંબવરીય નાટકો સેનામાં ન હતાં (‘પ્રેમાનંદ’નાં ત્રણ નાટકોનો પ્રસિદ્ધિ સમય ઈ. સ. ૧૯૬૨થી ૧૯૬૪ છે.). એ કાળ દરમિયાન વિષ્ણુદાસ ભાવેએ ૧૯૪૩ માં લખેલા ‘સીતાસ્વયંવરાખ્યાન’થી જ મરાઠી નાટકની શરૂઆત થઈ એવો જ સર્વસંસ્કૃત મત હતો અને મરાઠી રંગમંચના જનકેતનું માન પણ તેમને જ અપાયું હતું.

૬. આથી એ તર્ક પર આવી શકાય કે વિષ્ણુદાસે રચેલાં નાટકોનાં નામ પાછળ ‘આખ્યાન’ શબ્દ લગાડાતો જોઈને જ ચર્ચિત ત્રણ નાટકો પાછળ પણ મરાઠીનું અનુકરણ કરી ‘આખ્યાન’ શબ્દ વાપરવાનું એના કર્તાઓને સૂઝ્યું હોવું જોઈએ.

૭. આ નાટ્યત્રયીના લેખકને મરાઠી નાટકોના નામનું જ અનુકરણ કરવાનું કેમ સૂઝ્યું, અન્ય ભાષાપ્રદેશોનું કેમ નહિ તેનો ઉત્તર, ભૌગોલિક રીતે મહારાષ્ટ્ર અને ગુજરાતના સીમાડાઓ અડીને હતા તેટલો જ નથી પણ બંને ભાષાઓની રંગભૂમિઓ એક બીજી પર અસર કરતી મુંબઈમાં વિકસી હતી તે તથા ‘પ્રાચીન કાવ્યમાલા’ ગાયકવાડ સરકારના આશ્રયથી વડોદરામાંથી જ પ્રસિદ્ધ થતી હતી એ પણ છે. મરાઠી સાહિત્યની હીલચાલો વડોદરાવાસીને વધુ સુપરિચિત હોઈ શકે. આ નાટકો પર મરાઠીની અસરનું વિગતે નિરૂપણ કવિ પ્રેમાનંદનાં નાટકોમાં થયું જ છે.^૭ ડૉ. પ્રસન્ન વઝીએ પણ ‘પ્રેમાનંદ’નાં નાટકોના પ્રયોજકોના હેતુઓ વિશે વિચારતાં, મરાઠી વિદ્વાનોની હરીફાઈ કરી સરસાઈ કરી બતાવી ગાયકવાડ સરકારનો વધુ આશ્રય મેળવવાની વૃત્તિ હોય તેમ પણ કહ્યું છે.^૮

૮. ઉપરના મુદ્દાઓ લક્ષમાં લેતાં, ગુજરાતી આખ્યાન-પ્રકાર સાથે અંશમાત્ર પણ સામ્ય ન ધરાવતાં હોવા છતાં એ ત્રણ નાટકોને ‘આખ્યાનો’નું નામકરણ કરવા પાછળ વિષ્ણુદાસ ભાવેની^૯ ‘કૃતિઓ’ કર્તાના ખ્યાલમાં હોય એવી શક્યતા હોવાનો પૂરો સંભવ જણાય છે.

^૭ ‘કવિ પ્રેમાનંદનાં નાટકો’ (ઈ. સ. ૧૯૧૦) : ન. ભો. દિવેડિયા પૃ. ૨૬થી ૩૩, ૩૬થી ૪૧, ૪૪, ૪૫, ૫૬થી ૬૨.

^૮ “વડોદરામાં મરાઠી વિદ્વાનો ગાયકવાડનો ‘આશ્રય’ મેળવવા ચલન કરતા હોય તો તે ચલને ઝાંખો પાડી થોડે વધારે આશ્રય મેળવવાની ખટપટમાં જેમ બને તેમ વધુ પુસ્તકો પ્રગટ કરવાની તબવીજમાં પ્રાચીન કાવ્યમાળાના સંપાદકો પડ્યા હોય. આ માત્ર એક કલ્પના છે. પ્રેમાનંદમાં આરેખિત કરેલી પ્રાંતીય ઈર્ષ્યાવાળી ભાષા-ભક્તિ, વારંવાર મરાઠી ભાષા અને સાહિત્ય વિશે અસુચામચાં એ કૃતિઓમાંથી મળતા ઉદ્દેશ્ય, આ કલ્પનાને કંઈક ટેકો આપે છે.”

—ડૉ. પ્રસન્ન વઝીએ : ‘પ્રેમાનંદની સંક્ષિપ્ત કૃતિઓ’, પૃ. ૨૪૮.

^૯ ભોસલે કે ભાવેનાં નાટકોને ૩૬ અર્થમાં ‘નાટકો’ કહી શકાય કે નહિ, ભોસલેથી ભાવે વચ્ચે દોઢસો વર્ષનો ગાળો હોવા છતાં તે કાળ દરમિયાન મરાઠીમાં લખાયેલ એક પણ નાટક હજી સુધી કેમ પ્રાપ્ત થયું નથી, એ બંને પર ફક્તિલના ‘ભાગવત-મેલાનાટકમ’, ‘દશાવતાર’ કે ‘યક્ષગાન’ની કેટલી અસર—આ અને આવા અન્ય મુદ્દાઓ અંગેનાં સંશોધનો પણ રસિક અને મરાઠી નાટ્ય પ્રવૃત્તિને બાંધવા ઉપકારક થઈ પડે તેવાં છે; પણ અત્રે ‘પ્રેમાનંદ’નાં નાટકોને ‘આખ્યાન’ નામની ઉપલક્ષ્ય કચાંથી થઈ એની એક શક્યતા અંગેની ચર્ચા જ અધિપ્રેત હોઈ આવા અન્ય મુદ્દાઓની અછડતી ચર્ચા પણ અને અપ્રસ્તુત મળી છે.

Summary

The term ākhyāna in the titles of the spurious plays of Premānand

1. It has been already proved by eminent scholars like late Shri N. B. Divatia and others that the plays earlier ascribed to Premānand are nothing but a forgery. But the question of why they were called 'ākhyānas' but has not been satisfactorily answered.

2. Looking to Marathi dramatic literature, it is found that Shri Vishnudas Bhave, who is considered as the pioneer of Marathi stage, named his plays as 'ākhyānas'.

3. Eminent historian Shri V. K. Rājwāde found out a play written by Bhosale in 1682 A.D., i.e., older than Vishnudās's, but it has neither been named as 'ākhyāna' nor 'nātak' but 'saṁvād'.

4. This proves that plays written in the latter half of the 19th century by Vishnudās and others were named as 'ākhyānas'.

5. Plays of Bhosale came into light in 1920 A.D.

6. Therefore it is evident that the plays of Bhosale were not known to the writers of Premānand's plays. It seems that they were aware of the plays by Vishnudās only.

7. Hence we can conclude that the word 'ākhyāna' used after these forged plays was in imitation of Vishnudās's practice.

[Why the authors imitated then contemporary nomenclature practice of Marathi plays and not of any other province is clear from the fact that both theatres were developed in Bombay influencing each other and the series in which these plays were published was 'Prāchin Kavyamālā' from Baroda, which too was a prominent meeting ground of the Marathi and Gujarati Languages and Literatures.]

THE VISION OF KAMALA MARKANDAYA

Dr. RAM SEWAK SINGH, M.A., Ph.D.

*University School of Languages
Gujarat University, Ahmedabad-9*

Of all the women novelists of India who write in English Kamala Markandaya is the most appealing and outstanding. She has a fine sense of language and the keen eyes of an observer of life. She has written so far only four novels, viz. *Nectar in a Sieve* (1954), *Some Inner Fury* (1955), *A Silence of Desire* (1960) and *Possession* (1963), but she has amply distinguished herself as a writer of sensibility with a subtle sense of form. Unlike Mrs. Praver Jhabvala who stuffs her novels with a plethora of details she has a wide range of subjects to cover and a subtle insight into the problems of the people of East and West. Whether it is a villager or a citizen, an ultra-modern lady or a Swamy, a young artist or an old tiller—she shows the same familiarity and facility of expression. She is at present in London and moves with sophisticated gentry, but there was a time when she had gone to the village to live with the peasants. This experiment in rural living has stood her in good stead. It has helped her to understand and portray authentically the inner life of the illiterate, boorish and helpless peasants also.

All her novels, barring *A Silence of Desire*, are written in a reminiscential mood: she plays the role of the narrator to describe what she has observed in the lives of a number of characters whom she has seen at close quarters. So these novels are written in the first person. But whereas *Nectar in a Sieve* and *Some Inner Fury* give the life-stories of the narrators, Rukmani and Mira, in *Possession* the narrator is a participant in the action only to the extent close friends are, being a mere witness to what is happening between Caroline and Valmiki;

A Silence of Desire is in the third person and here the writer essays to delve deep into the uncanny and hidden forces that had wrought estrangement between a husband, Dandekar and his wife.

Although at present Kamala Markandaya is away from India, she has lived sufficiently long in India to know the aspirations and frustrations of our people. As she has an intimate knowledge of the East as well as the West the most important feature of her novels is the stress on the interplay of various forces of these two cultures. The modern India of which she writes is an underdeveloped country: not yet fully exposed to the process of 'modernisation'. In an obscure village a tenant farmer Nathan marries a literate girl 'without beauty and dowry' and with the enthusiasm of a young groom he welcomes the bride home. He is understanding, hard-working and honest, but the true son of the soil he does not know how to bargain with life. Through thick and thin, rains and droughts and plenty and poverty, Nathan of *Nectar in a Sieve* braves the odds of life with the same tenacity and sense of renunciation with which Henchard of *The Mayor of Casterbridge* fought in his life. Rukmani was happy. She had the contentment every Indian peasant wife knows, 'while the sun shines on you and the fields are green and beautiful to the eye and your husband sees beauty in you which no one has seen before, and you have a good store of grain laid away for hard times, a roof over you and a sweet stirring in your body, what more can a woman ask for? My heart sang and my feet were light as I went about my work getting up at sunrise and going to sleep content. Peace and quiet were ours' (p. 17). But alas, with the installation of the tannery in their village 'peace and quiet' were banished for ever from their lives. This tannery proved fatal to Nathan's family. In need of jobs two of their sons joined it but soon after agitated for better emoluments, were sacked, and eventually sent to Ceylon, never to come back. One of the remaining four sons died at the hands of the watchman; their first daughter, Ira, unable to stand the pitiable sight of her

starving brother, decided to sell her body; they had to give their belongings to the greedy shop-keepers to raise a meagre sum to meet the demands of the rent-collector who announced that the farm on which they were working had been sold out to the tannery people; to cap it all Kunthi who had 'fire in her body' revealed to Rukmani that Nathan was the real father of her two sons 'while her husband in his impotence and she (Rukmani) in her innocence did nothing' (p. 120). As they were now old, and were unable to reconcile their habits and attitudes to the demands of the changing times, they wanted to spend the last days of their lives with their son who was working in the city. But here again the same grim realities stared them in the eye: they lost their belongings in the temple, resorted to beggary, and when the need arose broke stones to sustain themselves, and ultimately submitted to the inscrutable forces of destiny. Nathan died of pneumonia and Rukmani returned to her son and daughter in the village along with the crippled boy, Puli who had been their guide and friend during their stay in the city.

While facing these grim odds if Rukmani had experienced a moment of comfort it was only when she had met Kenny, the missionary. Kenny had helped her and her daughter during their confinements and had given them financial help whenever he could. But through ill luck he was not correctly understood by his wife as also by the people of this country. He was simply shocked to know how Indians could depend on the monsoon, and 'bear our sorrows in silence, and all this...so that the soul may be cleansed'. He struck his forehead and cried to Rukmani, 'My God! I do not understand you. I never will. Go, before I too am entangled in your philosophies' (p. 155). He was a foreigner, but with 'a rare gentleness in him' he was working for Indians putting aside his personal worries. He was puzzled to think as to which country actually he belonged: 'Until today I had thought, perhaps it was this' (p. 149); but in spite of his sincere interest in the uplift of our people he remained an alien element and was never allowed to identify himself with us.

It is on the model of this character Kenny that another missionary Hickey is introduced in *Some Inner Fury*. Here again Hickey is happy with the duties of Head Master of a school for orphans. But what distinguishes this novel from the first is the fully developed emotional relationship between the narrator, Mira and another Englishman Richard. Rukmani had been living on very intimate terms with Kenny since the day she had met him in her sick mother's house, 'tall and gaunt with pale skin and sunken eyes the colour of Kingfisher's wing, neither blue nor green', and 'stared' and 'goggled at him' (p. 31). She had nothing but respect and admiration for him. Once he had kept his arms also on her shoulders (when she had gone to seek his help to remove Ira's barrenness) which was seen by Kunthi and was interpreted as an affair. He had always found himself ready to stand by her in moments of crisis. But strangely enough she had always concealed from her husband the fact that she had got her sons only after undergoing his treatment. She knew her husband would not like it, and this is why she had taken elaborate precautions to keep Nathan ignorant about the visit she had paid him along with her daughter. He was ultimately a 'white man, a foreigner'. Arjun, the first son wanted a job in the tannery with the help of Kunthi's son, but Rukmani said, 'I'll ask Kenny to help you. White men have power.' On hearing this the son retorted, 'Indeed they have. Over men and events, and especially women' (p. 74). Now, in spite of this relationship, it is never mentioned that Rukmani had an affair with Kenny. Perhaps it was close friendship; or the uninhibited sympathetic responses of a missionary who had dedicated himself to the selfless service of the people of this country.

In *Some Inner Fury* this relationship between the Indian and the English takes different dimensions. Mira is an educated girl, daughter of a very rich man and sister of a Magistrate. She falls in love with Richard at first sight. Their emotional relationship develops quite on the individual plane, but in course of time it gathers social significance. She loves not a Mr. Richard,

but a white man, the like of whom according to her cousin Govind, 'not only set up their alien and unwanted institutions in the land but who, for the preservation of these institutions, invariably sided with those other white men who ruled the country, and with whom otherwise they had little in common' (p. 166). These words which were spoken to describe Hickey, the missionary, aptly describe Richard for the simple reason that he was, unlike the ruler Englishmen, a simple and straight forward lover. When the whole nation was up against the white men, the crowd taking Govind, the convict for arson and violence (but actually for civil disobedience) away from the court, how could Mira, an Indian and cousin stay behind: 'Soon I would go too. When the tail of that procession went through the door I would join it and Richard would stay behind. This was not a time for decision, for he knew he could not come with me, I knew I could not stay: it was simply the time for parting' (p. 285). The love she had known was 'lit with a splendour which had coloured and enriched our whole living: it could never be taken from us... We had drunk deeply of the chalice of happiness, which is not given to many even to hold', but she knew fully well, 'It is all one. In a hundred years it is all one,' and at the same time 'what matter to the universe if now and then a world is born or a star should die; or what matter to the world if here and there a man should fall, or a head or a heart should break' (p. 286). Her heart had broken, but the blood was spilt at the altar of Freedom. And this was her consolation—'When all this is over we can still be friends. Do you think so, darling, he said gently, and put his arms about me and held me, without passion, compassionately; and he did not have to tell me, nor I to say that my words were foolish mouthings, fashioned out of despair, empty and between us meaningless' (p. 8).

Premila and Kitswamy, the magistrate had agreed to go their separate ways, 'tacitly acknowledging thus the imperfect articulation of their marriage' (p. 224). They had faith in different ways of life. While preparing to accompany Kit to the new

place of his posting, she had 'taken her Veena, but Kit, though he was proud of her accomplishments, had no liking for Indian music. She had her Gita: but the verses he had learnt at school, Kit had long forgotten in his sojourn to Oxford' (p. 86). The only way out for her to avoid getting entangled in her husband's glamour born of proud position, was to keep aloof and busy herself with some altruistic work. Hence her prolonged absences from home, and attendance at the school of Hickey. Govind, with whom lately she had developed intimate relations, did not like her going to Hickey as the latter was a white man. When Kit took her dead body in his arms, Govind was heard to say, 'She loved you. You never loved her—you do not even know the meaning of love. You gave her nothing not even a home. You drove her to the village...you drove her to death' (p. 240). And this was correct as regards Kit's treatment of his wife, Premla.

This Premla of *Some Inner Fury* 'whose faith to her was a part of living' and 'her feeling for religion was deep and devout', reappears as Sarojini with some significant differences in Kamala Markandaya's third novel *A Silence of Desire*. For fifteen years Sarojini had been 'a good cook' and a devoted mother. The symbol of her faith was the tulasi plant in her courtyard, but Dandekar, her husband, a petty clerk, never prayed to it as he had no faith in God. If he had any faith it was in his wife's goodness, unstinted loyalty to him. He had come to believe that all women were good, loyal and devoted. But his amazement knew no bounds when he found his wife in possession of a photograph of an unknown man, supposedly her music teacher. On enquiry and detection he gathered that she was giving sittings to a faith-healer, a Swamy. So she was to this extent rotten! Keeping secrets from her husband, clandestinely meeting a Swamy, neglecting her husband and children and giving away her valuables to the wretched dwarf, the chief attendant of the Swamy. He met the Swamy to ask him to stop Sarojini from meeting him; but to no avail: 'Compulsion is the beginning of corruption' the Swamy had said. She did

not expect her husband who was trained in western notions, to understand 'what lies beyond reason' (p. 99). She was afraid he would send her to a hospital to cure her tumour and reason 'with me until I lost my faith, because faith and reason don't go together, and without faith I will not be healed' (p. 99). As he thought it was impossible to love his wife without jealousy he resented her secret absences and pronounced interest in some other man than himself; but what she was unhappy about was his lack of trust. Dandekar knew his wife was 'a woman who still gave him pleasure after fifteen years of marriage less from the warmth of her response than from her unfailing acquiescence to his demands' (p. 9), but as she had started going to the faith-healer she had lacked both, 'warmth of response' and 'acquiescence to his demands'. This irritated him, harassed him and goaded him into seeking the help of his boss Mr. Chari, an I.A.S. officer who himself had divorced his wife but was reputed for his understanding and sympathy. The Swamy was made to leave as he was found to be, in the words of Mr. Ghose, 'a fraud, an impostor, a man who preys on the credulous of whom there are so many in the south' (p. 232). Dandekar got back his valuables, 'his wife, himself and his children' (p. 252), all that he had fought for but he still smarted under the knowledge his wife gave him that her preparedness to expose herself to the knives of the doctor was consequent upon the Swamy's advice 'not to hold back when the time came... All will be well. He felt beholden and humbled of all people to *that* man, the Swamy who had achieved the impossible: 'sponged away those fears and memories, driven out her devils' (p. 246).

Here in *A Silence of Desire* is an analysis of the mind of a middle-aged husband who, used to certain comforts and responses, is unable to understand the sudden and surreptitious change in the manners and attitude of his wife. He had set opinions about the goodness of women. He did not want to be indiscreetly violent in the presence of his children, and at the same time did not want to be cuckolded by his wife.

The beautiful spots of the novel are where the writer through the silent actions of the husband describes his uncomfortable feeling of estrangement in his own home. In *Some Inner Fury* love was shown withering in both cases: first when the lover was an Englishman loving an Indian girl whose sympathies were with the Indians, and secondly, when the lover was an Indian trained under white men and was making excessive demands on his simple-minded Indian wife. In *A Silence of Desire* the relationship is well established after fifteen years of marital life, but it is suddenly found that it is balanced on a fine thread: a very delicate compromise between faith and reason. While Premila had preferred service to being kidded and Mira had preferred duty to love, Sarojini had chosen to stick to faith at the cost of displeasure and resentment of her husband.

If we review from a different angle the relation in which Sarojini stood to her husband and the Swamy, we will find that she was placed like a piece of iron between two magnets, the husband and the Swamy, who symbolised the physical and the spiritual. In Kamala Markandaya's fourth novel, *Possession*, this problem is discussed in detail. Valmiki discovers to his surprise that he is being pulled from two sides. He had talents, and was precocious, but if there was any patron and any audience it was the Swamy who had true admiration for the works of Val. He had never imposed his will on the young painter; on the contrary, he had always wanted him to feel free to do anything he wanted to, provided his conscience approved of his steps. Lady Caroline, 'rich, divorced, well-born...reputed to be beautiful' (p. 9) had spectacular qualities, which she believed in exhibiting to people, especially to those who understood the meaning. She also foresaw the bright future of Val, but unlike the Swamy she wanted to take him away from the caves to the world of glamour and make him popular. His parents who were willing to part with this idler of a boy, agreed to the proposal of Caroline to send him with her. She moved with him to various places and when he had grown

into a handsome youth and had become well-known for his skills, she developed a liaison with him. His instincts clamoured for satisfaction in the companionship of a young woman of his age, but Caroline manoeuvred a successful misunderstanding between the lovers. Nay, when Anasuya, the narrator of this story took him to India and left him back with his Swamy, she came after three months to claim him. She said she had offered him satisfactions—'satisfactions that I have given him and which he knows I can give' (p. 224)—which he would crave and then would like to go back to her. 'Then', the Swamy said, 'he will be free to go, but he will never stay until he has an equal freedom to return' (p. 224). And this is the crux of the problem. Val-like geniuses can go to the West in search of worldly glory : woman, wealth and fame, but they would never feel at home there, and would crave to come back to India, where it is believed, as the Swamy said, an artist 'works for that, and therein is the glory...it gives men a satisfaction so rich that they can't explain it, and mostly they do not even wish to' (p. 223). She blamed the Swamy for 'holding him, keeping him and exploiting him', but as a matter of fact it was she who wanted to possess the artist, and was making desperate efforts to 'hold him and keep him', ultimately to 'exploit' him. She had already gambled with her wealth and beauty; but as she 'came of a breed that never admitted defeat', she thundered, 'I shall take care to make him want me again: and on that day I shall come back to claim him', and with a faint contempt she added, 'of course, that day *will* come'.

Caroline somehow had believed that Val would be tamed into a bed-partner and a shining tag to her name, but the plan did not succeed. Val felt 'burnt out' in the absence of 'space, light and freedom' (p. 203) in that glamorous world and found on return that 'wilderness is mine. It is no longer terrible as it used to be' (p. 224). Away from the fleshly and the temporal world he had come back to Swamy's shelter and learnt to value the spiritual and the divine. This was his spiritual home from which he had come and to which he wanted to return.

In her literary journey from *Nectar in a Sieve* to *Possession* Kamala Markandaya has halted at various spots to review the past and the present of India. Unlike Raja Rao of *The Serpent and the Rope*, who takes upon his weak shoulders (the hero Rama is phthisis-ridden) the onerous responsibility of representing India with his knowledge of Sanskrit (which is doubtful) and Indian Philosophy, she makes no pretensions or assertions. She gives a narrative and then tries to find its symbolical significance. Both the sophisticated West and the East which is not yet conditioned to command 'ritual answers', have to go their ways. Kenny, Hickey, Richard and Caroline—all have come to love India and appreciate her genius, but have not succeeded in making her theirs. They believe in possession and exploitation, whereas we believe in freedom: political as well as psychic. As Mira chose to join the freedom-fighters at the cost of her sincere love for Richard, Val chose to stay in his wilderness rejecting Caroline's flesh and wealth. He is inspiration, and inspiration can never be commissioned into fine art. It takes its own time and it has its own ways of expressing itself. Like Valmiki, the first poet, this Valmiki of *Possession* also burst into expression, his expression operating from within, and not from without. If one has inspiration one can go anywhere and produce art, but as it is coquettish if it is not caught by the forelock, it may fade into barrenness in no time. Though he had all facilities and 'satisfactions' Val's inspiration failed him. If Caroline had the inspiration of Val, and Val the wealth and skill of Caroline it would have been the ideal combination. But alas, the piquant combination of her looks and his talent did not last long. She had a talent for recognising talents, and she had shown that in recognising that of Val, but she could never become a source of inspiration for the artist Val. The true source of inspiration for him was either the poor 'burnt out' post-war Ellie, a girl of twenty with a thin body and dull face, one of her hands crushed and mutilated under a Nazi jackboot; or 'soft' youth of a girl of eighteen, Annabel; but never Caroline whose 'power was...evil' and

'whatever its manifestations—however excusable its manifestations, or well-favoured the end—it would never be other than evil' (p. 179). And while touring America with her, when he had drawn a portrait it was of made Caroline lying in a pleasurable swoon on a sandy beach of the sea, and in spite of her long fine legs and slender thighs, the swan's elegance of her long white throat carried down the length of her body, her body upturned to the sun 'was beautiful, and innocent, and as false and empty as the blue illusion of sky that Valmiki had put like a meatcover over it' (p. 180). Under Caroline's patronage and training he had come to have 'a face scraped of thought and emotion' (p. 181).

It may not be correct to say that India is a country of snake-charmers and fakirs only, but it is to be conceded that Swamys have their unique place in our society. They are anachronisms in many respects, no doubt, but it can't be denied that the role they play in our life is significant. The Swamy of *A Silence of Desire* represents faith, and women like Sarojini who are not prepared to rely on the sagacity of science, are bound to go to them till they are properly trained to understand the importance of knowledge. Her faith in the Swamy puts the whole family to trouble and in a way paralyses the smooth functioning of the society: just one man, Dandekar upset and unhappy on finding his wife unpredictably secretive, becomes a nuisance to his office, to his family, to the Swamy's gang, and to the roadside labourers. The presence of the Swamy is a blot on society and nothing short of a reactionary force. The Swamy is surrounded by invalids and grotesques, the worst of them being the dwarf, but they all get the care and affection of the Swamy, whereas in *Possession* (here again the Swamy is surrounded by invalids) Caroline, the rich and beautiful woman is not allowed by them to go near the Swamy. In this novel, the Swamy is not unconcerned about the fate of his dependents; he believes in patronising Valmiki, till the latter chooses to seek his guidance. He symbolises uninterested appreciation of art against Caroline who is an incarnation of vested interests.

Kamala Markandaya, the novelist exploits only normal emotions. She has the graces of a woman and does not like to present violent scenes of outrage, more so because she prefers to write in the first person. But it seems on reading her novels that she has gradually plucked courage and now she does not blush to describe 'natural scenes' if necessary. In *Nectar in a Sieve* the emotional relation between Rukmani and Kenny lacks warmth (why, it is very ingeniously camouflaged in veiled language), and the affair between Nathan and Kunthi only mentioned as if in the placid life of the village this extra-marital relation had no serious bearings. In *Some Inner Fury* again the narrator is cautious and does not for once reveal the illicit love between Premla, Kit's wife and Govind, his cousin. Her own love with Richard is hot, though seldom indulgent. In *A Silence of Desire* again Dandekar's assignation with a whore is just an incident, but in the same novel the writer is excellent where he describes the mental conflict of Dandekar, a husband used to certain responses from his wife during fifteen years of marriage, now 'unable to accept her refusal, unable to keep from her and equally unable to enforce his demands' (p. 61). She shows superb grasp over such delicate moments as when he found his wife garlanding 'an unknown man, unknown to him, her husband' (p. 65), or when she in anger had lain beside her child her head pillowed on her arm, he had gone secretly to see her and out of affection to cover her with the coverlet of his bed, or when avoiding each other's eyes 'like conspirators, in tacit accord, they set about shielding their children, and when the children had left for school there was the maid, before whom they must posture and play-act' (p. 85).

By the time she came to write *Possession* she had shed off some of the layers of haziness and picked up courage to call a spade a spade. Caroline was already widowed, a rich and beautiful woman when she came to discover Val in the caves of India. In the meanwhile Val had grown into a young man, but with her 'beauty and immense strength that ran over it' (p. 179) she had continued to be 'miraculous, unfading youthfulness' (p. 181).

She was like Val's mother in that she had picked him up as a child and had him despite their imprecise ratio of age, addressed as 'my protegee' - 'my ward' - even 'my pupil'; but Anasuya notes with surprise, Caroline was never willing to accept the relation 'which floodlit with the possibility of narrow calculation the fourteen years' difference between Valmiki and herself' (p. 155). Rather she had mischievously foisted this relationship—between mother and son on Anasuya 'while stepping delicately to avoid it herself' (p. 155). One may find here hints at incest; but it was not this relation that infuriated the writer into condemning her perverse love. By making Val her bed-partner she had emerged delivered from the tensions of the waiting, burning years' as a 'tender Caroline'; but even now 'she was not only possessed, but had also taken in possession' (p. 178). To escape unscathed, she had called Anasuya Val's mother and the Swamy a spiritual seducer.

Well, it is too difficult to judge who actually was the seducer but it is clear that Caroline was out for any chance to possess the young painter of India and exploit him. After India became independent in 1947 it became 'fashionable to know of India, to know Indians, to admire her art and to welcome her men and women. And it is against this attitude of the West that this novel is written when the European technologists in their play-shirts move about in India to help us build New India, and 'princes are two per paisa fighting Congresswallahs for the public posts' (p. 165). One has to go to the people to assess the significance of the role the artists were to play, thought Jumbo, the light-hearted moneyed Indian who bought satisfaction in the West whenever he felt the need; but it is to be regretted the novelist suggests that 'the people were still in a state of flux, undiscerning, as likely to applaud what was merely gaudy as what was good, uncertain about which features of the social system to cherish, and which to cast on the nearest tip' (p. 165). Leaders and connoisseurs knew full well how to build fame. Artists like Val, who knew what was what but were not skilled in the ways of politicians, were exceptions and stood 'between

people and sidestepping cognoscenti' (p. 165). The only way out after rejecting the glamorous West for Val was to depend on his inspiration and luxuriate in the thought that there is no waste 'in the work a man does to glorify his god, it is blasphemy to say that it is waste' (p. 223). Val was unhappy with Caroline because she had tried to 'own me and it is not an uncommon iniquity' (p. 122). The clouds of doubt and hazy thinking have not yet cleared. Caroline had asserted 'I shall take care to make Valmiki want me again, and on that day I shall come to claim him' (p. 224). We do not know as the Swamy said, 'if that day comes'.

Thus it can be said that the central problem that vexes the mind of Kamala Markandaya most is the outcome of the spell of intimacy between two cultures, the East and the West. India owes much to the West for rendering help to facilitate the process of modernisation, but she cannot, and has not compromised her honour. The cause of freedom and the pride of her glorious tradition have always given courage to her citizens. She has experienced, and has regard for the sympathy of Kenny and the love of Richard; but would never barter away her individuality and independence: she would assimilate rather than be 'possessed' and crippled.

“ RASAVADĀDI ALAṂKĀRAVARGA ”*

T. S. NANDI

University School of Languages

Gujarat University, Ahmedabad-9

Whether the theory of Rasa first originated in the field of dramaturgy and was accepted in the field of Poetics much later, or vice versa is yet a matter of argument. Earlier writers on Poetics had their own notion of *kāvya* which consisted of Word and Sense taken together in general. All that rendered charm to poetry was termed *Alaṁkāra*. *Bhāmaha* calls it ‘*Vakrokti*’ in general (II.85).¹ *Daṇḍin* also takes the term in a wider sense (II.i) and applies it to anything that may render charm to poetry.² *Vāmana* takes the word *Alaṁkāra* in a wider sense and defines *Alaṁkāra* as ‘*Saundarya*’ (I.i.2).³ Thus, whatever is a source of charm in poetry, is broadly termed *Alaṁkāra* by the earlier writers on Poetics. These writers must not have been unaware of the theory of Rasa, propounded by *Bharata*. It seems that they tried to approach this problem of Rasa, and its position in poetry, by taking it as *Alaṁkāra*, which was recognised as the source of Beauty in poetry. This might explain the appearance of the whole group of *Alaṁkāras* such as *Rasavat*, *Preyas*, etc. The treatment of these *alaṁkāras* throws a flood of light on the attitude of the earlier writers on the position of Rasa in poetry.

We will try to study the treatment of these *alaṁkāras*, not only by the earlier writers such as *Bhāmaha*, *Daṇḍin* &c., but also by *Ānandavardhana*, *Abhinava*, and some post-dhvani authors such as *Mammata*, *Viśvanātha*, and *Jagannātha*.

* Accepted for reading at the Sanskrit Viśva Pariṣad to be held at Bangalore.

Bhāmaha treats of preyas, Rasavat, Ūrjasvi and Samāhita in the third priccheda. Rasavat is defined at III-6, as that, which clearly manifests the Rasas such as Sṛṅgāra and other rasas.⁴ Bhāmaha is thus quite familiar with the concept of Rasas.

Preyas for him is what Vidura said to Kṛṣṇa when he came to his home — “O Govinda, the pleasure that I derive to-day from your coming to my home will arise, in course of time, only when you arrive again⁵”. It should be noted that Bhāmaha has not defined Preyas, Samāhita and Ūrjasvi. The illustrations cited throw some added light on the treatment of Rasa by him.

In later writers on Alampkāra we find that ‘Rati’ with reference to God, preceptor, king &c, does not give rise to Rasa, but makes for Bhāvadhvani only. But for Bhāmaha, as we have seen, it is an alampkāra, as in case of Preyas. Thus, a Bhāva depicted in a poem takes the form of either Preyas or that of Ūrjasvi. Ūrjasvi is also not defined but only illustrated at III-7 as, the serpent discharged with the arrow by Karṇa towards Arjuna, when it came back, was rejected by Karṇa with the words: “O Salya, does Karṇa aim twice?”⁶ This speech of Karṇa displays a lofty bhāva of valour or Saurya, not developed to the stage of Rasa, and therefore not Rasavat in which, it has to be shown clearly—spaṣṭa. Thus, the other two, viz. Preyas and Ūrjasvi are concerned only with the exhibition of Bhāvas alone. Samāhita is treated at III-10, as, ‘Samāhita is illustrated in Rājamitra, when Kṣatriya ladies were going to appease Parasurāma, Nārada appeared before them”.⁷ Here, Bhāmaha refers to a situation in which the Kṣatriya ladies, being terrorised by the wrath of Parasurāma who was out to kill their husbands, were making an effort to appease him. Nārada arrives and helps them in their cause. Thus the whole incident has some reference to the quelling of the emotion of anger. In later ālampkārikās, the element of chance occurrence on the part of Nārada is given greater importance, and it makes for the figure of speech called samādhi. The element of the quelling of emotion seems to have been ignored.⁸ Thus, the above discussion makes it clear that

Bhāmaha is not unfamiliar with the rasas in general, though he nowhere gives us a treatment of the theory of Rasa in poetry. But he subsums the fact of Rasa under what may be termed as 'emotion-based' *alamkāras*.⁹

Daṇḍin also, from the theoretical point of view, seems to hold an identical position with reference to the topic of Rasa. He also tries to incorporate Rasa, Bhāva &c. under such figures as Rasavat, Preyas &c.¹⁰

But as compared to Bhāmaha, Daṇḍin seems to have given more importance to Rasa. This is seen in his treatment of the figures such as Rasavat, Preyas &c.¹¹ Daṇḍin treats of these figures at II·280-287. He talks of Śṛṅgāra at II·281, of Raudra, at II·282, of Vīra, at II·284. Karuṇa is illustrated in II·286. Bibhatsa, Hāsyā, Adbhuta, and Bhayānaka are illustrated in II·288, 289, 290 and 291 respectively. Abhinava in his *Abhinavabhāratī* (pp. 272, Vol. I. Ns.), while explaining the causal view of Rasa held by Lollaṭa, says that earlier writers such as Daṇḍin also held a similar view.¹² The commentators try to read a fully worked out Rasa theory in Daṇḍin.¹³ But, as to its theoretic position in Kāvya, Daṇḍin says at II·287, that thus Kāruṇya, which is enhanced, is taken as *Alampkāra*.¹⁴ So even for him, Rasa is only an '*Alampkāra*' in poetry.¹⁵

Preyas is defined as '*Priyatarā-Khyāna*' at II·275. Preyas is felicitous expression and Rasavat happens where Rasa abounds. Ūrjasvi is where pride dominates or that which has appropriate excellence¹⁶. From the illustration cited by Daṇḍin, it becomes clear that for him, Preyas occurs in case of the suggestion of same Bhāva¹⁷. In the same way, Ūrjasvi exhibits the 'Bhāva' of 'Garva'. Both 'Preyas' and 'Ūrjasvi' exhibit a 'Bhāva' as a '*Kāvya'sobhākaradharma*' i.e. *alamkāra*. Rasavat, on the other hand, as seen above, exhibits fully developed Rasa in form of an *alamkāra*¹⁸.

Vāmana does not treat these *alamkāras*. He has tried to incorporate Rasa in his own way in the arthaguṇa called '*Kānti*', which is defined at III·2·15.¹⁹

Udbhaṭa treats the topic as below. In the fourth varga in his Kāvyaālaṃkāra, he mentions these figures in Kārikā I. He defines Preyasvat as: "Poetry which is composed so as to contain the indications of Bhāvas like Rati, by means of Anubhāvādi, is said to contain Preyas. The suggestion of these Bhāvas such as Rati and others, would lead us to Rasavat. So Vivṛtikāra says that here, Rati is to be taken only with reference to the god, king &c. In case of Rati with reference to the beloved, it is Rasavat.²⁰ Rasavat is defined at IV. 3 as, "that in which the development of sentiments such as sṃgārādi is clearly shown, and in which are included (the indicators such as) a verbal statement of the sentiment, the sthāyin, the Vibhāvas, and abhinayas.²¹ Urjasvi (IV. 5) is, "the delineation of sentiments (Rasas) and feelings (bhāvas) which hurt the sense of propriety in their deflection, or which are expressed in passion, anger &c.²² This is entirely a novel explanation of Ūrjasvi, not to be seen in either Bhāmaha or Daṇḍin. Again, the use of the terms such as, 'Kāmakrodhādikāraṇāt' probably suggests that Rasa, according to udbhaṭa is caused by factors such as Kāma, Krodha &c. Abhinava, as seen above, tried to read the causal view of Rasa of Lollata in Daṇḍin. Here also, probably we may read the same. Samāhita is defined at IV. 7 as, "the description of the quelling of sentiments (Rasa), feelings (bhāva), or their semblances (ābhāsas), quite unmixed with accessories (such as anubhāva).²³ Pratīhārendurāja observes that in case of Preyasvat the Bhāvas are ālaṃkāras and the Kāvya is ālaṃkārya.²⁴ So also, in Rasavat, the Kāvya is ālaṃkārya and Rasa is its ālaṃkāra.²⁵ He adds that whether the Rasa and Bhāvas that cause charm are to be taken as ālaṃkāras of kāvya or as the soul of kāvya is not discussed by us here. Pratīhārendurāja then proceeds to incorporate all dhvani under different ālaṃkāras. But this may be taken as reading later meaning, in view of the fact that udbhaṭa can not be taken as thoroughly cognisant of the theory of Dhvani²⁶. On Ūrjasvi he observes that at times, Rasas and Bhāvas are delineated so as to be in conformity with the Śāstras (i.e., technical works) or not. The former

makes for Preyasvat and Rasavat, while the latter makes for Ūrjasvi.²⁷ On Samāhita he says, that when quelling of Rasa, Bhāva or their ābhāsa is delineated it makes for this alampkāra. Ābhāsa is said to be there, when Rasa, Bhāva, &c. are not in harmony with S'āstra (i.e. technical works) and lokavyavahāra (i.e. popular practice).²⁸ Here, Pratiḥārendurāja considers the view of an objector which may be put as follows: well, in Samāhita, if there is quelling of one Rasa or Bhāva, there will be the rise of some other rasa or bhāva. Thus, it will be an illustration of Rasavat or Preyasvat. To this, the reply is that it is not so. If another rasa or bhāva seems to come up, its enhancement is retarded by some other factor, and thus complete quelling of emotion results in Samāhita.²⁹

Rudraṭa does not consider the alampkāras such as Rasavat Preyas &c. He considers twenty-three Vāstavamūlaka figures, twenty-one aupamyamūlaka figures, twelve atisāyamūlaka figures and two-fold śleṣa of word and sense, which is subdivided into ten + two = twelve varieties. He does not clarify the theoretical position of Rasa in Kāvya. On XII·2 Namisādhu says that the rasas are not considered while dealing with the figures of sense, because, poetry has word and sense for its body, and Vakrokti, Vāstava &c. as literary embellishments; while rasas are like beauty, the natural quality (sahajāḥ guṇāḥ) and therefore, are excluded.³⁰

Rudraṭa treats of Rasas in Chs. XII to XVI. He says at XII·1, that as the attainment of 'caturvarga'—'four-fold object' by the Sahṛdayas is done through kāvya in a charming way (laghu, mṛdu), because of Rasa being there (the topic of rasa is now considered).³¹ Thus, Rasas are treated by Rudraṭa with reference to the Kāvya-phala as derived by the Sahṛdaya. [Namisādhu explains it as: nanu kāvyakaraṇe kaveḥ pūrvameva phalamuktam, s'rotṛāṃ tu kiṃ phalamityāha.] Then, Rudraṭa enumerates in XII·3 Rasas viz. S'ṛṅgāra, Vira, Karuṇa, Bibhātsa, Bhayānaka, Adbhuta, Hāsyā, Raudra, S'ānta and Preyas. At XII·4 he says that rasas are so termed because they are relished as such—'rasanādrasatvameṣāṃ'. Namisādhu says that the ācāryas such as Bharata have called S'ṛṅgārādi to be rasas, because the

Stāyibhāvas are so relished. Thus, it seems that Rudraṭa here treats of Rasa-niṣpatti as seen in Bharata, and tries to correlate it with the saḥdaya who relishes rasa as a Kāvya-phala. Again, as seen above in the light of the remarks of Namisādhū, Rudraṭa is inclined to take Rasa as 'sahaja guṇa' — natural quality — of poetry, as against Alaṃkāra, which is an external ornament. Vāmana was the first to say that guṇas are the eternal qualities of Kāvya, as against Alaṃkāra, which is an 'anitya dharma'. Vāmana incorporated Rasa under 'Kānti guṇa' which formed one of the essentials of Kāvya, as against mere alaṃkāra, which forms the external element in Kāvya. Thus, we see that the tendency to take rasa as something essential as compared to mere alaṃkāra (in its narrower connotation), first originated in Vāmana, and then was carried on further in Rudraṭa.

Again, Rudraṭa talks of Preyas as a separate Rasa at XV.17. Rati with reference to a friend gives rise to this Rasa. Thus, what in Bhāmaha, Daṇḍin and udbhata appears as an alaṃkāra called preyas, appears in Rudraṭa as an independent Rasa.

Ruyyaka in his Alaṃkārasarvasva says that Rudraṭa has described the Bhāvālaṃkāra as two-fold. Rūpaka, Apahnuti, Tulyayogitā, Upamā &c. are described as subservient to the expressed sense and Utpreksā is described as something only indicated. Rasa, Bhāva &c. are described as rendering charm to the expressed sense, in form of Rasavat, Preyas &c. Thus for Rudraṭa, on the authority of Ruyyaka, Rasa, Bhāva &c. are only alaṃkāras.³² But Ruyyaka's remarks do not seem to be correct when we read them along with the Kāvya of Rudraṭa. For actually Rudraṭa does not treat the alaṃkāras such as Rasavat, preyas &c. But on the other hand, he treats of Rasas as independent entities, which make for Kāvya-phala with reference to a connoisseur.

With Ānandavardhana, we enter into a new era of Sanskrit Poetics. Ānandavardhana has a well-defined theory of Dhvani as the soul of Kāvya. He also speaks of Vyañjanāvya-

pāra through which the suggested sense is gathered. Thus, Rasa for him, is one of the types of Dhvani, which is the soul of poetry. But, as a man who does not disrespect tradition, he had to accept the Alampkāras such as Rasavat, Preyas &c. So, he gives them an entirely new connotation and alots some place to them in a Kāvya.

Ānandavardhana treats of Rasavat and other alampkāras in the second udyota. He starts the whole discussion with a remark that "Now onwards, we will try to show that Dhvani of the variety of asaṃlakṣyakrama (i.e., that in which the sequence is imperceptible) is different from the alampkāras called rasavat and others."³³ At Dhvanyālo II-4, it is observed that, "that is supposed to be the province of Dhvani, where all sorts of sources of charm that embellish the word and sense, are subordinated to Rasādi."³⁴ Ānandavardhana goes on to add that where the principal sense in form of rasa, bhāva, tadābhāṣa &c. is followed by the figures of words and sense, and also the literary embellishments (guṇas) as subordinate to them and where all these are established in poetry only in due consideration of Dhvani, there the term 'dhvani' is used with reference to poetry. In Kārikā II-5 it is clearly mentioned that, "where the expressed sense is predominant in a sentence and when Rasādayaḥ are subservient to it, in that particular piece of poetry, we accept the presence of the alampkāras called Rasādi."³⁵ He declares categorically, that, "Though others have explained the scope of Rasavadalampkāra (in a different way), I hold that, when in a poem, another sense is the principal one and rasādayaḥ are subordinated to this, it is the case of Rasādi alampkāra."³⁶ Thus in cāṭūkti (or flattering speech), the Preyolampkāra forms the principal sense of the sentence, and other rasādis are subordinated to it. Ānanda, goes on classifying it as 'Suddha' and 'Sāṅkīrṇa' i.e. pure and mixed. The 'pure' occurs as in, 'Kimp hāsyena na me prayāsyasi . . . &c'. In this particular illustration, Karuṇa rasa, pure and simple, is subordinated and therefore it is a case of Rasavat. In the verse: Kṣipto hastāvalagnaḥ &c. the 'mixed' is illustrated. Here the vākyārtha is in form of 'tripu-

rāripurabhāvātisaya' — i.e. the extending valour of Lord Śiva, and irsyāvipralambha accompanied by s'lesa is subordinated to it.

Ananda then enters into a subtle discussion as below :
"When Rasa forms the vākyārtha, how can it become an alaṃkāra? Alaṃkāra is known to be a source of charm. It cannot beautify itself. The alaṃkāra is called an alaṃkāra only when it is so with reference to rasa or bhāva. So, it follows that when Rasādis form the principal sense of a sentence, it is not the case of the rasavat alaṃkāra, but it is a variety of Dhvani, while upamā and others are its alaṃkāras. But, when some sense, other than that of Rasādis is the principal one in a sentence, and when Rasādis (as subordinated) add some charm to it, all that is the province of Rasādi Alaṃkāra. Thus, Dhvani, Upamā, and Rasavadalāṃkāra &c. are said to have a separate field for each of them. He says that it is useless to say that Rasavat occurs only when the sentient objects form the vākyārtha. He reaffirms his view in the fact that when Rasādayaḥ are subordinated, they become alaṃkāras, and when they are principal, it is the case of Dhvani.³⁷

Abhinava also elaborates the whole theme in his Locana. He supports the view that in Rasavadādi alaṃkāra, Rasa, Bhāva &c. are subordinated.³⁸ It has been suggested that vastudhvani cannot be satisfactorily explained by alaṃkāras such as saṃśāsokti & others. Now, it is made clear that Rasādi dhvani also cannot be incorporated into the alaṃkāras such as Rasavat, Preyas &c. Abhinava concludes that, it stands that Risis are suggested. The suggestion occurs either principally or in a subordinate way. When it is former, it is Dhvani, and when it is latter, it is Rasādi alaṃkāras.³⁹ It should be noted that Abhinava clearly says that when Rasa, Bhāva &c. are subordinated to something else, it is a case of Rasavat, Preyas &c. This 'something else' is of the form of 'rasa', 'vastu' or 'alaṃkāra'. It is not necessarily 'rasa' alone. Thus, Rasavat occurs when Rasa is subordinated to any other rasa, vastu or alaṃkāra.⁴⁰ This gives a wider scope to the figure Rasvat and it stands in sharp contrast to the limited scope given to it by later writers

is as *Vaśantā* and others, who hold that *Rasavadādi* occur only when *rasa*, *bhāva*, &c. are subordinated to any other *rasa*, *bhāva* &c. which are *Vākyaarthibhūta* i.e. principal, and not to any other 'vastu' (or matter) or *ālamkāra* (i.e. a figure of speech).

Kuntaka does not accept the theory of *Dhvani* and *Vyañjana*. He tries to revive the old tradition of the *Ālamkārikas* such as *Bhāmaha*, *Daṇḍin* and *Udbhaṭa*. So his theory of *vikrokti* is probably a newer version of the idea mentioned by *Bhāmaha* at II-85 wherein it was stated that '*Vakrokti*' lies at the back of all the *ālamkāras*. Thus, Kuntaka ultimately accepts the case of *Rasvat*, *Preyas* &c. as *ālamkāras*, but only as *pratīyamāna* or implied.

Kuntaka first of all, rejects the case of *Rasavat* and such other *ālamkāras*. He deals with these *ālamkāras* in the third *unmeṣa*. He declares at III-2 that *Rasa* is never gathered in any other form (except that of *ālamkārya*)¹ again, there is no conformity of word and sense to that effect. Thus *Rasavadādi* cannot be accepted as *ālamkāras*. He proceeds in his *vṛtti* as below :

(i) The cultured critics do realise in any composition of a good poet, the difference between the *ālamkārya* and of the *ālamkāraṇa*. But, when we say that poetry is '*rasavadālamkāra-yukta*', we fail to realise the said distinction. If the *śṛṅgārādi* *rasas* are principally *ālamkārya* then there should be something else as *ālamkāra*. If, on account of its being the source of charm to the cultured, the *rasa* is termed as *ālamkāra*, then something else should stand as *ālamkārya*. But we fail to recognise this in case of the earlier *ālamkārikas* such as *Bhāmaha* and others. (We have explained the position of *Bhāmaha* and others, Kuntaka does not seem to interpret them in the right way.)

(ii) *Bhāmaha* has defined *Rasavat* as, '*darsitaspṛṣṭa śṛṅgārādirasam yarbā*'. This definition can be explained in more ways than one. But in no way can we accept the *ālamkāratva* of *Rasavat* and others. If the above definition is explained with the

help of the bahuvrihi compound i.e. that in which s'ṅgārādi are darsita and spaṣṭa or sprṣṭa—the difficulty is that we fail to make out any object which forms the sense of the Bahuvrihi compound. If this—anya padārtha-object—is 'kāvyā' or a poem itself, then there is upakramopasaṃhāra—vais'amyadustatva (fault of inconsistency between the beginning and the end). In the upakrama, i.e. the beginning, Bhāmaha and others have accepted alaṃkāras as separate from word or sense which make for the body of a poem. If the statement of Bhāmaha is taken to mean that, 'that which has rendered clear s'ṅgārādi', then, we fail to find out 'that' which renders clear s'ṅgārā and others. If you say that this is of the form of 'pratipādanavaicitrya', then also, it cannot be accepted. For, in that case, 'pratipādyā' itself is 'pratipādanavaicitrya'. Thus, 'alaṃkārya' itself becomes its own 'alaṃkāra'. This is untenable. If Bhāmaha's statement is explained as the 'pratipādanavaicitrya' with reference to rasādis that are clearly manifested, then also, it is unacceptable, because when s'ṅgārādis are clearly manifested, they make for the siddhi—establishment—of any alaṃkāras or alaṃkārya as distinct from themselves.

(iii) Kuntaka denounces Udbhaṭa all the more. Udbhaṭa has defined rasavat as seen above. Now, with reference, to 'Savas'abdasthāyi—saṃcārivibhāvābhinayāspadam', Kuntaka says that when svas'abdavācyaṭva with reference to Rasa itself is a matter yet to be proved, how can it serve to establish the figure Rasavat and others?

(iv) Kuntaka also rejects the view of those who define it as, 'Rasavat Rasasam'srayāt.' Rasasam'sraya means that which has Rasa for its 'Sam'sraya'. Now what is this object which has Rasa for its Sam'sraya? It cannot be anything less than Kāvya itself. Now in that case, it is already rejected earlier. If 'rasasam'sraya' is taken as saṣṭhi tatpuruṣa compound, then also it cannot mean anything but Kāvya.

(v) Again, others try to explain Rasavat Alaṃkāra as below—just as due to rasasaṃcāra even dry trees become green,

in the same way, due to the touch of Rasa, the Vākyārtha which is alamkārya becomes alamkāra. This cannot be accepted; for how can anything which is once an alamkārya become alamkāra later on?

(vi) Again, there is asangati with reference to Śabdārtha. The term rasavat can be explained (a) as a tatpuruṣa, as—rasavataḥ alamkāraḥ—i.e. the alamkāra of rasavat; or as (b) a karmadhāraya as—rasavaccāsau alamkāraḥ—either way there is śābadārthāsangati i.e. both the explanations are away from sense. It may be asked as to what is that Rasavat which has its alamkāra called rasavat? And if rasavat is alamkārya, how can it be an attribute of the alamkāra?

(vii) If in, 'the alamkāra of rasavat', the term rasavat is taken to mean Kāvya, then rasavat being a Kāvyaalamkāra becomes the common name for all the alamkāras such as upamā rūpaka &c. Thus, no alamkāra will be left in its pure form as unmixed with Rasavat.

(viii) Kuntaka takes even Ānanda, to task. He says that the particular illustration, viz. Kasipto hastāvalagnaḥ &c. is not appropriate. Fundamentally, Kuntaka fails to imagine the coexistence of the two virodhi rasas viz. Karuṇa and Śṛṅgāra, which, according to him, is a serious rasadoṣa, and also holds that the lover and Lord Śiva cannot be compared with reference to s'arāgni. Both of them are known to possess different qualities also. Thus, this is, anucitaviṣaya carvanācāturyacāpala on the part of Ānanda. Again, there is confusion between alamkārya and alamkāra as explained above.

(ix) He has denounced in the fashion of Ānanda. the view of those who accept Rasavat with reference to the sentient and upamādi with reference to the insentient. He explains rasavat in his own way in III-15 as: "If any alamkāra causes delight to the cultured on account of the delineation of Rasatattva, that alamkāra is termed as Rasavat. The example cited is

upodharāgeṇa vilolatāarakam &c.⁴² He concludes that,

(a) The rasavat alaṃkāra is the crest jewel of all the alaṃkāras;

(b) It serves to make for the 'sarasatā' of the 'nīrasa' padārthas in the hands of a poet; and

(c) This alaṃkāra is always pratiyamāna.

Kuntaka also deals with the other alaṃkāras such as Preyas, Ūrjasvi &c. He considers and rejects the definitions of these alaṃkāras as given by the earlier authors. He refuses to recognise Preyas & Ūrjasvi as alaṃkāras in the same way as in case of Rasavat. He holds that Daṇḍin's 'Priyatarākhyaṇam' is only 'vyājastuti', and so also Udbhata's 'Bhāva kathana' can be any alaṃkāra such as vyājastuti. Udbhata's ūrjasvi is rejected on the grounds that any rasābhāsa or Bhāvābhāsa that goes against ancītya can never be accepted in poetry and much less in form of an alaṃkāra.

Mamīṇa does not treat Rasavat, Preyas &c. in form of alaṃkāras. But he includes Rasavat, Preyas, Ūrjasvi and Samāhita under the second variety of guṇibhūtavyaṅgya, viz. Aparāṅgavyaṅgya, which term he explains as—
aparasya rasādervācyasya vā vakyārthībhūtasya āṅgaṃ rasādi
anuraṇanarūpaṃ vā. Thus, when one rasa becomes subservient to another Rasa, it is the case of Rasavat of the earlier ālaṃkārikas, as illustrated by: Ayaṃ sa rasanoṭkarṣi &c. Rasa subserves Bhāva as in, kailāsālayabhūtalocanarucā &c. One Bhāva subserves another bhāva as in (i.e. Preyas)—atyuccaḥ paritaḥ sphuranti girayaḥ &c. Mamīṇa says, "atra bhūviṣayo ratyākhyo bhāvo rājaviṣayasya ratibhāvasya." Ūrjasvi has subordination of one rasābhāsa or bhāvābhāsa with reference to another bhāva, as in bandikṛtya nṛpa dviṣaṃ &c. Samāhita of the earlier ālaṃkārikas, wherein there is subordination of bhāvasānti to bhāva, is illustrated in 'aviralakaravāla kaṃpanaiḥ &c. Bhāvodaya is seen in, 'sākaṃ kuraṅgakadrśā &c.; Bhāvasandhi in, 'asoḍhātatkālollasadasahabhāvasya tapasaḥ &c.' The author notes that here there is combination of āvega and dhairya. Bhāvasabalatā as subordinated to bhāva is seen in, 'Pasyetkaścicchala capala re' &c. Thus,

Mammata's treatment is brief and logical. But, we can make out that he does not openly recognise them as alampkāras but wants to assign some higher place (Madhyamakāvya) to them by placing them under guṇibhūtavyaṅgya.

Viśvanātha takes them as alampkāras and defines them at S.D. X.95 & 96. He has nothing new to offer.⁴³ For him, when rasa, bhāva, the semblance of rasa and bhāva, and the quelling of bhāva are reduced to a subordinate position, they become alampkāra and are termed as Rasavat, Preyas, Ūrjasvi and Samāhita. Bhāvodaya means the following: 'Udaya' means, the condition of being in process of evolution', thus bhāvodaya occurs when a bhāva is described in the process of occurring and not as completely evolved. The latter is the province of Preyaḥ. When Bhāvodaya is subordinated to something else, the figure is bhāvodaya. In the same way, Bhāvasaṃdhi occurs when it is subordinated to something else. Same is the case with Bhāvasābala.

Viśvanātha mentions nearly four views on Rasavat, as an alampkāra. Some hold that Rasa, bhāva &c. are upakārya, and how can they be upakāraka? So rasavat, preyas &c. cannot be taken as alampkāras. Others say that Rasavat, Preyas &c. are called alampkāras only in a secondary sense (bhākta), and must be accepted in compliance with the practice of the earlier authors. These people say that the alampkāras such as upamā, rūpak &c. enhance rasa only indirectly while rasavat, preyas &c. do it directly. But the fact of enhancing the rasa being common, they can be termed as alampkāra by lakṣaṇā alone. Still others maintain that an alampkāra is so called only when it subserves Rasa (Rasādyupakaraṇa matreṇālaṃ kārataṃ mukhyataḥ). The fact that rūpakādi alampkāras embellish the sense (i.e. the body of poetry) is analogous to the udder hanging from the neck of a she-goat. In rasavat, as in Rūpaka and others, Rasa, the soul, is embellished, and therefore, the designation of alampkāra to rasavat and others is not secondary (bhākta) but is strictly correct.

Viśvanātha gives his own view in the words : "Abhiyuktāh tu . . &c.". This view holds that Rasabhāva, &c. which have become subordinate (to something else) and which are themselves helped (upakṛta) by words and sense that manifest them, quite properly obtain the domination of ornament, as they help other Rasabhāva &c. which are principal, by embellishing the words and senses that suggest the latter. Alampkāras are those which assist the principal Rasa through words and senses that manifest them. In Rasavat preyas &c. certain words and senses manifest a particular Rasa or Bhāva; this latter again is subordinate to another Rasa and assists it through words and senses which manifest the principal Rasa. It is therefore quite proper that Rasavat and others are termed as alampkāras. Rasavat and Samāsokti differ in this that in Samāsokti only the vyavahāra is charming and this is not Rasa. There is no Āswāda of one Rasa which subserves another Rasa. He also quotes Ānandavardhana to support his view. He refutes the other views.

We may take note of the fact that in the hands of Viśvanātha, the scope of Rasavat and others is slightly narrowed on account of the fact that according to Ānandavardhana and Abhinava, Rasavat, Preyas &c. occur also when the Alampkārya is not only Rasa, Bhāva &c. but also vastu, or Alampkāra while Viśvanātha, in harmony with his theory which accepts only Rasadhvani as the soul of poetry, wants it to be just Rasa, Bhāva &c. alone.

Jagannātha does not treat of the alampkāras such as Rasavat, Preyas &c. He only mentions them somewhere only casually.

Thus, we have seen that the earlier Ālampkārikas such as Bhāmaha, Daṇḍin &c. do not totally ignore the fact of Rasa. But they try to incorporate it under 'Alampkāra' which was the only source of charm to kāvya. Daṇḍin is more elaborate in his treatment. Udbhata also seems to be better informed about the concept of Rasa and its position in kāvya. He is probably the first rhetorician to take Rasa as 'svasabdavācya'.

or 'expressed by its own proper noun.' Ūrjasvi receives a novel treatment in his hands. But one thing is clear that for all these, viz. Bhāmaha, Daṇḍin and Udbhaṭa, the ultimate 'alampkārya' is 'kāvyā' itself, and Rasa, Bhāva &c. are only alampkāras in the wider sense of the term.

In Vāmana and Rudraṭa we come across a different trend. They choose to place rasa in 'guṇa', what is for them a 'nityadharma' of poetry. Thus 'Rasa' forms one of the essentials of Poetry, as compared to 'alampkāra' which is only an external factor. 'Alampkāra' thus is used in a narrower connotation.

Ānandavardhana, with his theory of Dhvani and vyañjanā gives a new orientation to the whole theme. 'Rasa' for him is a variety of Dhvani. So, the alampkaras, such as Rasavat, Preyas &c. receive a novel treatment in his hands.

Kuntaka tries to revive the old tradition of alampkāra as seen in Bhāmaha, Daṇḍin &c. So, he takes Rasavat, Preyas &c. as alampkāras only. But he has a unique approach to this topic, when he accepts these alampkāras as only implied.

Mammaṭa is more logical when, in keeping with the theory of Dhvani, he takes Rasa as only suggested. He, therefore, does not consider Rasavat, preyas &c. as alampkāras, but treats them under 'Guṇibhūtavyangya'.

In Viśvanātha, we again see Rasavat, Preyas &c. as alampkāras, but as already observed, he allows a limited scope to these figures, when compared with the treatment of these alampkāras by Abhinava.

FOOT-NOTES

- ¹ भामह. II. 85. सैषा सर्वेषु वक्रोक्तिरनयार्थो विभाव्यते ।
यत्नोऽस्यां कविना कार्यः कोऽलङ्कारोऽनया विना ॥
- ² दण्डिन्. II. i. काव्यशोभाकरान् धर्मान् अलङ्कारान् प्रवक्षते ।
- ³ यामन. I. i. 2. सौन्दर्यमलङ्कारः ।
- ⁴ भामह. III. 6. रसवद्दशितस्पर्शशृङ्गारादिरसं यथा ।
देवी समागमसूक्ष्ममस्करिण्यतिरोहिते ॥

Bhāmaha does not choose to go into any detailed treatment of Rasa. At I-21, he says that the Mahākāvya should be—युक्तं लोकस्वभावेन रसेन सकलैः पृथक् । At V-3 he says : स्वादु काव्यरसोन्मिश्रं शास्त्रमप्युप-युज्यते । Probably, herein the word 'Rasa' (in kāvyarasa) is not to be taken in a technical sense.

- ⁵ भामह. III. 5. प्रेयो गृहागतं कृष्णमवादीद्विदुरो यथा ।
अद्य या मम गोन्दि जाता त्वयि गृहागते ।
कालेनैषा भवेत्प्रीतिस्तवैवागमनात्पुनः ॥

This has been quoted by Daṇḍin also. Appayya Dikṣita takes it as an example of Ananvaya Dhvani.

- ⁶ Bhāmaha. III. 7 : उज्ज्वलं कर्णेन यथा पार्थाय पुनरागतः ।
द्विः संदधाति किं कर्णः शल्येत्यहिरपाकृतः ॥

- ⁷ भामह. III. 10 : समाहितं राजमित्रे यथा क्षत्रिययोषितां ।
रामप्रसक्त्यै यान्तीनां पुरोऽदृश्यत नारदः ॥

- ⁸ S. D. X-86 : समाधिः सुकरे कार्ये दैवाद्वस्त्वन्तरागमात् ।

⁹ At II-85 Bhāmaha uses the term 'Vibhāvvyate'. Abhinava tries to explain it in a technical sense of 'Vibhāvana'.

¹⁰ Daṇḍin speaks of Rasa elsewhere also. He defines Mādhurya (I-51) as, 'माधुर्यं रसवद्वाचि वस्तुन्यपि रसस्थितिः i.e. 'the — establishment of Rasa in word and in object' At II-292 he explains 'Mādhurya' as 'agrāmyatā' or 'absence of Vulgarity.'

[II-292 is : वाक्यस्याप्राप्त्यतायोनेर्माधुर्यं दर्शितो रसः ।

इह त्वष्टरसायत्ता रसवत्ता स्मृता गिराम् ॥]

तद्वचनं वाचस्पति explains as : एवं शृङ्गारादिभिः अष्टभिः रसैः पूर्वदर्शितेन च अप्राप्त्यता-
रूपेण रसेन नवधा रसत्वम् इति रसवदलङ्कारम् उपसंहरति वाक्यस्येति । This is not

very clear. हृदयंगमा probably explains it in a clearer way when it says : माधुर्यगुणे प्रदर्शितः

अव्ययार्थोऽयमव्ययतया जातः रसः वाक्यस्य भवति ।

अलङ्कारतया निर्दिष्टं रसवत्त्वं अन्तरसायसमेव ।

Daṇḍin does not seem to take rasa in any technical sense, but only in the general sense of 'Kāvya-rasa' alone, in all these occurrences. Hemacandra says the same when he says :

श्रुतिवर्णानुप्रासभ्यां वाग्रसः ...अप्राम्याभिधेयतया तु वस्तुरसः । माणिक्यचन्द्र also agrees to this. He says, (Ms. 189. आनन्दधर्म ed.)—श्रुतिवर्णानुप्रासभ्यां वाग्रसः...अप्राम्याभ्यतया तु वस्तुरसः । इत्थं रसो द्वेषा । At III-149. again, 'गिरा रसः' is explained by Taruṇavācaspati as 'साधुत्वम्' only. At I-62. also, 'Rasa' does not carry any technical connotation. I-62. reads—

कामं सर्वोप्यलङ्कारः रसमर्थे निषिद्धतु ।

तथाप्यप्राम्यतैवेन भारं वहति भूयसा ॥

¹¹ Daṇḍin also expects, like Bhāmaha, the Mahākāvya to depict, without exception, Rasa and Bhāva. [see, I-81. — अलङ्कृतं असंक्षिप्तं रसभावनिरन्तरम् ।] तरुणवाचस्पति & हृदयंगमा take 'Rasa' and 'Bhāva' here in their technical sense. But we may take this, with Dr. De in the general sense of 'Kāvya-rasa'.

¹² अभिनव भा. (m. 272. vol. I.Ns.)—चिरन्तनानां चायमेव पक्षः । तथा हि दण्डिना स्वालङ्कारलक्षणेऽभ्यधायि । 'रतिः शृङ्गारतां गता' रूपबाहुल्ययोगेन । इति (काव्यादर्शे ii-281) 'अचिरकालं परां कोटिं कोपो रौद्रतमतां गतः (ii-283) इत्यादि च ।

¹³ तरुण. says at II-281 : तदिदं रसवत् । रूपबाहुल्ययोगेन विभावानुभावव्यभिचारयोगेन इत्यर्थः ।

The हृदयंगमा adds—रत्याभिधानः एष स्थायी भावः मृतेत्यादिना वागारम्भानुभावेन अनुमीयमानैः हर्षवृत्तिस्मृतिवितर्कप्रसृतिभिः व्यभिचारिभिः संख्यमयः कण्ठानन्तरं शृङ्गाराख्यां लभते । तेन अन्वितमेतत् रसवत् ।

रंगाचार्य रेड्डी also follows तरुण. He says that herein, वासवदत्ता is the 'विभाव' her sweet words, smile &c. are the anubhāvas and हर्ष, विस्मय &c. are the Vyabhicāribhāvas. The स्थायिभाव called रति is enhanced to the state of शृङ्गाररस.

¹⁴ दण्डिन. II-287 — इति काव्यमुद्रिकमलङ्कारतया स्थितम् ।

¹⁵ Dr. De observes : (pp. 212 Sanskrit Poetics)—“ But the Rasa in these figures is subordinate to the expressed figure

itself to which it serves as a means of embellishment. (अलंकारतयास्मृतम्); in other words, the Rasa is developed not for its own sake, but as increasing the beauty of expression." I fail to agree with this. By 'अलंकारतया स्मृतम्' what Daṇḍin means is that here Karuṇa Rasa becomes the alaṃkāra of Kāvya. The term Alaṃkāra is to be taken, as noted above, in its wider sense of a काव्यशोभाकारणम्. For, otherwise, we fail to trace any other अलंकार in these illustrations, to which the particular rasa can be subordinated. Again, Daṇḍin calls Rasavat to be that which is 'rasapes'ala' i.e. that which causes delight due to Rasa (II-275).

16 दण्डिन् II-275: प्रेयः प्रियतरारव्यानं रसवद्रसपेशलम् ।

ऊर्जस्वि सदाहंकारं युक्तोत्कर्षं च तत्प्रथमम् ॥

17 तरुण. says — देवगुरुपित्रादिविषयः प्रीतिप्रकर्षः प्रेयः ।

18 Some modern commentators such as Reddi seem to overread things when they observe that Rasavat, Preyas and Ūrjasvi are grouped together because all of them born the varieties of what is called असंलक्ष्यक्रमध्वनि — (त्रयाणां असंलक्ष्यक्रमरूपैकधर्मत्वात् एकत्र निर्देशः) — It is doubtful whether Daṇḍin could be held to be conscious of the classification of Dhvani as above.

19 बामन III-ii-15 : दीप्तरसत्वं कान्तिः ।

20 विवृतिकार — रतिरिह देवगुरुपुत्रादिविषया गृह्यते । कान्ताविषयायाः तु रतेः सूचने रसवदलङ्कारो वक्ष्यते ।

21 उद्भट IV-iii : रसवद्वर्धितस्पष्टशृङ्गारादिरसादयम् ।

स्वशब्दस्थायिसम्भारिविभावामिनयास्पदम् ॥

22 IV-5. अनौचित्यप्रवृत्तानां कामक्रोधादिकारणात् ।

भावानां च रसानां च बन्ध ऊर्जस्वि कथ्यते ॥

23 उद्भट IV-7 : रसभावतदाभासवृत्तेः प्रशमनबन्धनम् ।

अस्यानुभावनिःशून्यरूपं यत्तत्समाहितम् ॥

24 प्रतीहारेन्दुराज — अत्र च भावानामलङ्कारता, काव्यमलङ्कार्यम् ।

25 प्रतीहारेन्दुराज — एतेषां च स्वशब्दादीनां पञ्चानां समस्ततया आस्वाद्यत्वेन काव्येन स्फुटरूपतया शृङ्गारादिरसाविर्भावो दृश्यते तत्काव्यं रसवत् । रसाः खलु तस्यालङ्कारः । and adds, रसानां भावानां च काव्यशोभातिशयहेतुत्वात् किं काव्यालङ्कारत्वं उत काव्यप्रीवितत्वं इति न तावद्विचार्यते, प्रबन्धगौरवमयात् ।

28 प्रतीहारानुराग — यन्नु यत्र सहस्रयह्ववाह्यादिभिः प्रधानभूतस्य स्वभावव्यापारस्तृप्त्येन प्रतीयमानैकस्वस्य अर्थस्य सद्भावस्तत्र तदाविधार्यामिव्यक्तिहेतुः काव्यजीवितभूतः कैचित् सहस्रयह्व-
निर्माणं व्यञ्जकव्यवेदात्मा काव्यधर्मोऽभिहितः स कस्मादिह नोपदिष्टः । उच्यते । एवमेवालङ्कार-
ध्वन्तर्भावात् ।

27 प्रति. — कश्चित् खलु रसभावानां शास्त्रसंविदविरुद्धेन रूपेण उपनिबन्धः क्रियते
कश्चित् तदविरुद्धेन । तत्र यत्र शास्त्रसंविदविरुद्धेन रूपेण तेषां उपनिबन्धः तत्र प्रयोऽलङ्कारो
रसवदलङ्कारव्याभिहितः । यत्र तु तद्विरुद्धत्वं तन्मूललोकव्यवहारविरुद्धत्वं च तद्विषयानां
रसभावानां उपनिबन्धे सत्युद्देशिकाव्यं भवति ।

28 इह रसभावानां शास्त्रसमवाविरुद्धेन तदविरुद्धेन च रूपेण द्वैविध्यमुक्तम् । तत्र ये
शास्त्रसमवाविरुद्धाः रसभावास्ते रसभावशब्देनात्र विवक्षिताः । तद्विरुद्धास्तु तदाभासाः ।
तेषां रसभावानां तदाभासानां च या वृत्तिः स्वाश्रयसम्बन्धात्मिका तस्याः प्रशमे निबध्यमाने
समाहितालङ्कारो भवति ।

29 अन्यस्य रसाद्यन्तरस्य येऽनुभावादयस्तैः निःशेषेण शून्यं रूपं यस्य तत्तथोक्तम् । यत्र
पूर्वेषां रसादीनां वासनया दाढ्येन तेषूपशान्तयेऽप्यपि रसाद्यन्तराणानां न स्वरूपमाविर्भवति
आविर्भवदपि वा कार्यवक्षेण केनचित् तिरोधीयते तत्र समाहितालङ्कारो भवति ।

30 नमिसाधु on रुद्रट XII. 2 : अर्थालङ्कारमध्य एव रसाः अपि किं नोक्ताः
उच्यते — काव्यस्य हि शब्दार्थौ शरीरम् । तस्य च वक्रोक्तिवास्तवादयः कटककुण्डलादय इव
कृत्रिमाः अलङ्काराः । रसास्तु सौन्दर्यादय इव सहजाः गुणाः इति भिन्नस्तत्प्रकरणारम्भः ।

31 ननु काव्येन क्रियते सरसानामवगमश्चतुर्वर्गे ।

लघु मृदु च नीरसेऽभ्यस्ते हि त्रस्यन्ति शास्त्रेभ्यः ॥ रुद्रट XII. i.

32 रुच्यक — रुद्रटेन तु भावालङ्कारो द्विर्वचोक्तः । रूपकापह्नुतितुल्ययोगितादाबुपमाद्य-
लङ्कारो वाच्योपस्कारकत्वेनोक्तः । उत्प्रेक्षा तु स्वयमेव प्रतीयमाना कथिता । रसवत्प्रेयः प्रभृतौ
तु रसभावादिर्वाच्यसोभाहेतुत्वेनोक्तः ।

33 इदानीं रसवदलङ्कारादलक्ष्यक्रमयतोमात्मनो ध्वनेर्विविक्तो विषय इति प्रदर्श्यते ।
ध्वन्या. II.

34 ध्वन्या. II. 4 : वाच्यवाचकचारुत्वहेतूनां विविधात्मनाम् ।

रसादिपरता यत्र स ध्वनेर्विषयो मतः ॥

35 ध्वन्या. II. 3 : प्रधानेऽन्यत्र वाक्यार्थे यत्राङ्गं तु रसादयः ।

काव्ये तस्मिन्लङ्कारो रसादिरिति मे मतिः ॥

36 ध्वन्या. on II. 5 : यद्यपि रसवदलङ्कारस्यान्यैर्दक्षितो विषयस्तदापि यस्मिन् काव्ये
प्रधानतयाऽन्योऽर्थो वाक्यार्थभूतस्तस्य चाङ्गभूता ये रसादयस्ते रसादेरलङ्कारस्य विषया इति
मामकीनः पक्षः —

37 तस्मादज्ञत्वेन रसादीनामलङ्कारता । यः पुनरङ्गी रसो भावो वा सर्वाकारमलङ्कार्यः
स ध्वनेः आत्मा इति ।

³⁸ अङ्गत्वमस्ति रसुदीनां रसवत्प्रेय ऊर्जस्विसमाहितालङ्काररूपतासामिति भावः । अभिनव.
(लोचन. on ध्वन्या. II. 5).

³⁹ तस्मात् स्थितमेतत् — अभिव्यञ्ज्यन्ते रसः प्रतीयमानः च रसवत्त्वः कश्चिः । तस्य अभिव्यञ्जितः
प्रधानतया भवत्यन्यथा वा । प्रधानत्वे ध्वनिः अन्यथा रसालङ्काराः । — अभिनव.

⁴⁰ अन्यत्रेति । रसस्वरूपे वस्तुमाने अलङ्कारस्तथा योऽप्येव । लोचन. on ध्वन्या. II. 5.
अलङ्कारो न रसवत् परस्याप्रतिभासनात् ।

⁴¹ स्वरूपादतिरिक्तस्य शब्दार्थासङ्गतेरपि ॥ व. जी. III. ii.

⁴² कुन्तक III. 15 : रसेन वर्तते तुल्यं रसवत्त्वविधानतः ।
बोडलङ्कारः स रसवत् तद्विधादादनिर्मिते ॥

⁴³ S.D.-X.95.96 : रसभावौ तदाभासौ भावस्य प्रथमस्तथा ।

गुणीभूतत्वमावान्ति बदालङ्कृतयस्तदा ॥

रसवत् प्रेय ऊर्जस्वि समाहितमिति क्रमात् ।

भावस्य चोदये सन्धौ

ભારતીય તાર્કિકોની પ્રત્યક્ષવિષયક ચર્ચા

કો. નવલકિશોર શાસ્ત્રી

બા. ઇ. ભારતીય શિક્ષક-વિદ્યાલય, અમદાવાદ-૬

[૧]

મોલમ આદિ પ્રાચીન નૈયાયિકોએ પ્રત્યક્ષ, અનુમાન, ઉપમાન અને શબ્દ એ ચાર પ્રમાણો સ્વીકાર્યા હતાં, અને એ એમની સામાન્ય સમજ હતી કે વસ્તુવિષયક અવ્યક્ષિપ્ત જ્ઞાનને પ્રમાણ કહેવાય. પરંતુ એ નૈયાયિકોને એક એવા યોગિજ્ઞાન (અને તેય અવ્યક્ષિપ્ત) ની સંભાવનામાં વિશ્વાસ હતો જે ન તો ઇન્દ્રિયસન્નિવૃત્ત વસ્તુવિષયક હોય કે ન તો અનુમાન ઉપમાન અથવા શબ્દની કોટિનું હોય. શબ્દવાદી તથા વિજ્ઞાનવાદી મહાયાની દાર્શનિકોએ મતની સ્થાપના કરી કે યોગિજ્ઞાન પ્રત્યક્ષ, અનુમાન, ઉપમાન, તથા શબ્દ આમાંથી કે પછી કોટિમાં નથી આવી શકતું; પ્રત્યક્ષકોટિમાં એટલા માટે નહિ કે તે ઇન્દ્રિયાર્થસંનિવૃત્ત જન્ય નથી; તથા અનુમાન, ઉપમાન, શબ્દની કોટિમાં એટલા માટે નહિ કે તે જ્ઞાનાન્તર નિરપેક્ષ (= નિર્વિકલ્પક) છે (આપરે અનુમાન, ઉપમાન, તથા શબ્દ જ્ઞાનાન્તરસાપેક્ષ છે) પોતાના આ અત્તી સહાયતાથી એ મહાયાની દાર્શનિકોએ પોતાના એ મૂળ મંતવ્ય સમર્થન કરવાને ઇચ્છ્યું કે સત્ય એ કોટિનું હોય છે: એક પારમાર્થિક, બીજું વ્યાવહારિક કારણ કે એમને આધારે તેઓ કહી શકે કે પારમાર્થિક સત્યનો ભોધ (અવગતિ) કરાવનાર યોગિજ્ઞાન પારમાર્થિક પ્રમાણ છે તથા વ્યાવહારિક સત્યનો ભોધ કરાવનારા પ્રત્યક્ષ, અનુમાન ઉપમાન તેમજ શબ્દપ્રમાણ વ્યાવહારિક પ્રમાણ છે. આ રીતે સત્યને દ્વિકોટિક ન માનતાં નૈયાયિકોની સામે એ સમસ્યા આવીને ઊભી કે યોગિજ્ઞાનને એક સુનિશ્ચિત પ્રમાણ પદ હક રીતે આપવું. હવે એ તો સ્પષ્ટ હતું કે યોગિજ્ઞાન જ્ઞાનાન્તરસાપેક્ષ (અવિકલ્પક) નથી, એથી અનુમાન, ઉપમાન અથવા શબ્દમાં એનો અન્તર્ભાવ કરવો નિતાન્ત અસંભવ હતો; પરંતુ સાથે સાથે યોગિજ્ઞાન ઇન્દ્રિયસન્નિવૃત્ત જન્ય ન હોવાને કારણે એનો અન્તર પ્રત્યક્ષમાં કરવાનું પણ સરળ ન હતું. હા, પ્રત્યક્ષનું એક એવું લક્ષણપ્રણયન સંભવિ હતું જે ઇન્દ્રિયપ્રત્યક્ષ અને યોગિજ્ઞાન બન્નેય ઉપર લાગુ થઈ શકે, અને નૈયાયિકોએ તે કમું પણ કર્યું. આ રીતે તેઓ કહી શક્યા કે સત્ય એકકોટિક છે અને યોગિજ્ઞાનસહિ બધાંજ પ્રમાણો એ સત્યની અવગતિ કરાવનારા છે [આ પ્રસ્તુત ચર્ચામાં સરળતા ખાતર અને ઇચ્છાસરને યોગિજ્ઞાનનો એક પ્રકરવિશેષ માનીને ચાલ્યા છીએ, કારણ કે ઇતિ જ્ઞાનની કલ્પના પ્રણય યોગિજ્ઞાનની બેમ ઇન્દ્રિયજન્ય, નિર્વિકલ્પક, તથા અવ્યક્ષિપ્તરૂપે સ્વર્ભા કરવામાં આવી છે.]

કંઈકે આવી અત્તી સમસ્યા—એકે તદ્દન વિન્ય કારણેને સહિ—જેમ દાર્શનિક સમજે પણ ઉપસ્થિત થઈ, જેઓની અભાગિક અન્યતા અનુસાર તેજ જ્ઞાન પ્રત્યક્ષ કહેમક

જેને પ્રાપ્ત કરવામાં આત્માને કોઈ પણ ઉપકરણની જરૂર ન પડે. અનુમાન, ઉપમાન, તથા શબ્દ જેવાં સવિકલ્પ જ્ઞાનોના વિષયમાં કહેવાયું છે કે તેમને પ્રાપ્ત કરવા આત્માને મનની સહાયતાની આવશ્યકતા રહે છે, તથા ઇન્દ્રિયપ્રત્યક્ષને વિશે કહ્યું છે કે તેને અર્જિત કરવા આત્માને ઇન્દ્રિયોની મદદ લેવી પડે છે. આ રીતે જૈન દર્શનિકોને મતે અવધિ, મનઃપર્યાય અને કેવલ આ ત્રણ પ્રકારનાં જ્ઞાન જ (જેમને સરળતા ખાતર અમે યોગિજ્ઞાનના ત્રણ પ્રકાર માનીને ચાલીએ છીએ) પ્રત્યક્ષ કહેવાવાને અધિકારી છે. પરંતુ ઇન્દ્રિયાર્થસન્નિર્કર્ષ-જન્ય જ્ઞાનને પ્રત્યક્ષાન્તર્જૂત ન માનવું એ કંઈ સરળ કામ ન હતું. એટલે જૈન દર્શનિકોની સામે પણ સમસ્યા આવી કે પ્રત્યક્ષનું એક એવું લક્ષણ બતાવવું જે યોગિજ્ઞાન તથા ઇન્દ્રિયપ્રત્યક્ષ બન્નેયને લાગુ પડી શકે.

આમ આપણે જોઈએ છીએ કે નૈયાયિક (અને એમના સમાનતન્ત્રીય વૈશેષિક) દર્શનિકો સામે તેમ જ જૈન દર્શનિકો સામે બંને જુદાં જુદાં કારણોને લઈને હો પણ એક જ સમસ્યા આવીને ખડી થઈ અને તે એ કે પ્રત્યક્ષનું એક એવું લક્ષણ બતાવવું જે યોગિજ્ઞાન તથા ઇન્દ્રિયપ્રત્યક્ષ બન્નેયને લાગુ પડે. મીમાંસા દર્શનિકોની સમક્ષ આ સમસ્યા એટલા માટે ઉપસ્થિત ન થઈ કેમ કે તેમને યોગિજ્ઞાનની સંભાવનામાં જ વિશ્વાસ ન હતો (અને ઈશ્વરના અસ્તિત્વમાંય ન હતો).

ન્યાય-વૈશેષિક તથા જૈન તાર્કિકોએ પ્રત્યક્ષલક્ષણપ્રણયનની સમસ્યાનો ઊકેલ લાવવા અનેક રીતે પ્રયાસ કર્યો છે. કેટલાક તાર્કિકોએ તો પ્રત્યક્ષના પર્માયવાચી કોઈ શબ્દવિશેષને જ પ્રત્યક્ષનું લક્ષણ ગણી લીધું. ઉદાહરણ્યાર્થ, સિદ્ધસેન દિવાકરે તેમ જ ભાસર્વજ્ઞે “અપરોક્ષ જ્ઞાન”ને અને ઉદયનાથે “સાક્ષાત્કારિ જ્ઞાન”ને પ્રત્યક્ષના લક્ષણરૂપે પ્રસ્તુત કર્યું. કેટલાક જૈન તાર્કિકોએ (ઉદાહરણ તરીકે અક્લંક, હેમચંદ્ર અને યશોવિજયગુપ્તે) “વિશદ અથવા સ્ફુટ જ્ઞાન”ને પ્રત્યક્ષના લક્ષણરૂપે આપ્યું, પરંતુ આ કંઈ સમસ્યાનું સમાધાન ન હતું; કારણ કે ત્યારે પ્રશ્ન ઊઠે છે કે “વિશદતા અથવા સ્ફુટતા”ની શાસ્ત્રીય પરિભાષા શી હોઈ શકે? અક્લંકે “અનુમાનાદિની અપેક્ષાએ એક વિશિષ્ટ કોટિની અર્થપ્રતીતિ”ને વિશદતાનું લક્ષણ ગણ્યું, પરંતુ આ માનવું ‘અપરોક્ષ જ્ઞાન’ને પ્રત્યક્ષનું લક્ષણ માનીએ એના જેવું જ છે. ગંગેશે “જ્ઞાનાકરણિક જ્ઞાન”ને તથા હેમચંદ્રે “પ્રમાણાન્તરનિરપેક્ષ જ્ઞાન”ને પ્રત્યક્ષના લક્ષણરૂપે આપ્યું છે; આ બન્ને લક્ષણ તત્ત્વતઃ સમાન છે પરંતુ એમને સવિકલ્પ પ્રત્યક્ષ પર લાગુ પાડવામાં મુશ્કેલી પડે છે (જે કે ગંગેશ અને હેમચંદ્ર બન્નેય સવિકલ્પકોટિના પ્રત્યક્ષની સંભાવના સ્વીકારે છે). ઇન્દ્રિયાર્થસન્નિર્કર્ષજન્ય જ્ઞાન તે તે સ્મૃતિવિશેષનું ઉદ્યોધક બનીને ઉક્ત અર્થના તે તે સ્વરૂપવિશેષના નિશ્ચાયક જ્ઞાનનું નિમિત્ત બને છે. આ માન્યતા ન્યાય-વૈશેષિક તથા જૈન તાર્કિકોની જ નથી બલકે બૌદ્ધ તથા મીમાંસક તાર્કિકોની પણ છે. આ ઇન્દ્રિયાર્થસન્નિર્કર્ષજન્ય જ્ઞાનને નિર્વિકલ્પક તથા આ સ્વરૂપવિશેષનિશ્ચાયક જ્ઞાનને સવિકલ્પક માનવાની બાબતમાં પણ આ બંધા તાર્કિકો એકમત છે. હા, એટલું અવશ્ય છે કે બૌદ્ધ તાર્કિક આ નિર્વિકલ્પક જ્ઞાનને જ “પ્રત્યક્ષ” સંજ્ઞા આપે છે અને આ સવિકલ્પક જ્ઞાનને ‘પ્રત્યક્ષપ્રજ્ઞાતી વિકલ્પ’ અથવા ‘સાવૃત’ માત્ર કહે છે, જ્યારે જૈન તાર્કિક આ સવિકલ્પક જ્ઞાનને જ “પ્રત્યક્ષ” સંજ્ઞા આપે છે અને નિર્વિકલ્પક જ્ઞાનને

“દર્શન” માત્ર કહે છે. આ બન્નેયથી ત્રિલુપ્ત, ન્યાય-વેશીષિક તથા મીમાંસક તાર્કિક આ નિર્વિકલ્પક જ્ઞાનને “નિર્વિકલ્પક પ્રત્યક્ષ” અને સવિકલ્પક જ્ઞાનને “સવિકલ્પક પ્રત્યક્ષ” સંજ્ઞા આપે છે. આવી દશામાં સવિકલ્પક પ્રત્યક્ષને, જે અનિવાર્યરૂપે સ્મૃતિસાપેક્ષ છે, જ્ઞાનાન્તરનિરપેક્ષ ન કહી શકાય. તેથી સવિકલ્પક પ્રત્યક્ષને જ એકમાત્ર પ્રત્યક્ષ માનનાર અને સ્મૃતિને પ્રમાણાન્તર અણુનાર હોમખંડ “પ્રમાણાન્તરનિરપેક્ષ જ્ઞાન”ને પ્રત્યક્ષના લક્ષણરૂપે ન આપી શકે. આ રીતે ગંગેશ પણુ “જ્ઞાનાકરણુક જ્ઞાન” આ પ્રત્યક્ષલક્ષણુને સવિકલ્પક પ્રત્યક્ષ ઉપર લાગુ નહિ કરી શકે. ગંગેશ આ પ્રકારની મુદ્દેલીને ખ્યાનમાં રાખીને જ પ્રત્યક્ષજનનમાં સ્મૃતિની ભૂમિકાના પ્રશ્ન પર મૌન ધારણુ કર્યું છે તથા “જ્ઞાનાન્તરનિરપેક્ષ” પદને સ્થાને “જ્ઞાનાકરણુક” પદને પોતાના પ્રત્યક્ષલક્ષણુમાં લાખ્ય કર્યું છે. ગંગેશ એવી રીતે વાત કરે છે જ્યણે નિર્વિકલ્પક પ્રત્યક્ષ સ્વતઃ (અર્થાત્ સ્મૃતિની સહાયતા વિના જ) સવિકલ્પક પ્રત્યક્ષને જન્મ દેતું ન હોય! જો એમ કહો કે સવિકલ્પક પ્રત્યક્ષજનનના પયોગી સ્મૃતિને ગંગેશ “નિર્વિકલ્પક પ્રત્યક્ષ”માં અન્તર્ભૂત માને છે તો એ પ્રશ્ન ઊભો થાય કે સ્મૃતિસાપેક્ષ સવિકલ્પક પ્રત્યક્ષ પ્રમાણુ તથા સ્મૃતિસાપેક્ષ અનુમાન, ઉપમાન તેમ જ શબ્દ પ્રમાણોની વચ્ચે તાત્ત્વિક અન્તર શું રહ્યું? એમ કહી શકાય કે સવિકલ્પક પ્રત્યક્ષની કારણુભૂત સ્મૃતિનું કારણુ કોઈ જ્ઞાનવિશેષ ન હોઈ ઇન્દ્રિયાર્થસન્નિકર્ષ માત્ર છે (અર્થાત્ એમ કે સવિકલ્પક પ્રત્યક્ષનું કારણુ બધે સ્મૃતિરૂપ જ્ઞાનવિશેષ હો પરંતુ એનું કારણુ કોઈ જ્ઞાનવિશેષ નથી) જ્યારે અનુમાન, ઉપમાન, તથા શબ્દ-પ્રમાણોને વિશે આમ ન કહી શકાય; પરંતુ આ કહેવું એટલા માટે સંગત નહિ થાય કેમ કે ઇન્દ્રિયાર્થસન્નિકર્ષ સ્મૃતિનું જનન સાક્ષાત્ ન કરતાં ઉક્ત અર્થવિષયક અનુભૂતિના જનન દ્વારા કરે છે. વસ્તુતઃ ઇન્દ્રિયાર્થસન્નિકર્ષજન્ય આ અર્થવિષયક અનુભૂતિ જ પ્રાચીન ભારતીય તાર્કિકોનું નિર્વિકલ્પક જ્ઞાન છે, અને આ નિર્વિકલ્પક જ્ઞાન જ સ્મૃતિ-વિશેષના ઉદ્ભવે દ્વારા સવિકલ્પક જ્ઞાનને જન્મ દે છે. કહેવાનો આશય એટલો જ છે કે ઇન્દ્રિયાર્થસન્નિકર્ષ તથા સવિકલ્પક જ્ઞાનની વચ્ચે બે કહીએના સ્થાને એક કહીની કલ્પના કરવાનો ગંગેશનો પ્રયત્ન સફળ નથી, એમ નથી. એટલે, સરળતા પ્રત્યક્ષોત્પત્તિની પ્રક્રિયામાં નિમ્ન લિખિત ચાર ક્રમિક સોપાન આનવામાં રહેશે :

૧. ઇન્દ્રિયાર્થસન્નિકર્ષ
૨. અર્થવિષયક ઇન્દ્રિયાનુભૂતિ
૩. સ્મૃતિવિશેષ
૪. અર્થવિષયક સવિકલ્પક જ્ઞાન.

ભારતીય તાર્કિકોનો પારસ્પરિક મતભેદ એ પ્રશ્નને લઈને નથી કે પ્રત્યક્ષોત્પત્તિની પ્રક્રિયાનાં ઉપર્યુક્ત ચાર સોપાન માનવા કે નહિ, પરંતુ એ પ્રશ્નને લઈને છે કે દિતીય તથા ત્રુથ્ય સોપાનને કઈ સંજ્ઞા આપવી? ઉપર કહ્યા પ્રમાણે, બૌદ્ધ તાર્કિક દિતીય સોપાનને “પ્રત્યક્ષ” તથા ચોથાને “પ્રત્યક્ષપૃષ્ઠભાવી વિકલ્પ” અથવા “સાંજ્ઞત” કહેશે જન તાર્કિક દિતીય સોપાનને “દર્શન” તથા ત્રુથ્યને “પ્રત્યક્ષ” કહેશે, જ્યારે ન્યાય-વેશીષિક તેમ જ મીમાંસા તાર્કિક દિતીય સોપાનને “નિર્વિકલ્પક પ્રત્યક્ષ” તથા ત્રુથ્યને “સવિકલ્પક પ્રત્યક્ષ” કહેશે. આ રીતનો સંજ્ઞાસંબધી મતભેદ તો આધુનિક આનસરાસીઓમાં પણ

વિરલ નથી. ઉદાહરણાર્થ, કેટલાક માનસશાસ્ત્રીઓ દ્વિતીય સોપાનને Perception તથા ત્રીજાને Understanding કહેવાનું પસંદ કરે (આ મત બોદ જેવો થશે). કેટલાક દ્વિતીયને Sensation તથા ત્રીજાને Perception કહેવાનું પસંદ કરે (આ મત જૈન જેવો થશે). અને કેટલાક દ્વિતીયને indeterminate Perception તથા ત્રીજાને determinate Perception કહેવાનું પસંદ કરે (આ મત ન્યાય-વૈશેષિક તથા મીમાંસા જેવો થશે). વસ્તુતઃ એક ઇન્દ્રિયસન્નિવૃત્ત અર્થના સ્વરૂપવિષયક (=સ્વરૂપ નિશ્ચાયક) યાવત જ્ઞાનને (ઉક્ત અર્થવિષયક ઇન્દ્રિયાનુભૂતિને નહિ) “પ્રત્યક્ષ પ્રમાણ” સંજ્ઞા આપવી ઉચિત થશે. ઉક્ત અર્થવિષયક ઇન્દ્રિયાનુભૂતિને “પ્રત્યક્ષ પ્રમાણ” સંજ્ઞા ફેરી એટલા માટે ઉચિત નહિ ગણાય. કેમ કે જ્ઞાનના પ્રામાણ્યનું નિયામક એ જ્ઞાનનો સ્વવિષયભૂત અર્થની સાથે અન્યબિચાર છે, જ્યારે અર્થવિષયક ઇન્દ્રિયાનુભૂતિના સંબંધમાં એ પ્રશ્ન જ ઊઠે નથી કે તેનો સ્વવિષયભૂત અર્થની સાથે અન્યબિચાર છે કે બિચાર ?

“ઇદં તથા પ્રતિભાસશાલી સમગ્ જ્ઞાન પ્રત્યક્ષ પ્રમાણ છે” આ હેમચંદ્રીય લક્ષણનો એ અર્થમાં જ સ્વીકાર કરવો જોઈએ, અર્થાત્ આ લક્ષણમાં આવેલા “ઇદં તથા” પદનો અર્થ “ઇન્દ્રિયસન્નિવૃત્તતથા” કરવો જોઈએ પછી જાણે એ અર્થ સ્વયં હેમચંદ્રને સ્વીકૃત ન હોય. હેમચંદ્ર દ્વારા આ અર્થનો અસ્વીકાર થવાનું કારણ હશે તેમનો (અન્ય જૈન, બોદ, તથા ન્યાય-વૈશેષિક તાકિંકોની જેમ) ઇન્દ્રિયાર્થસન્નિકર્ષાજન્ય પ્રત્યક્ષની સંભાવનામાં વિશ્વાસ; પરંતુ એ કહેવાની જરૂર નથી કે આધુનિક તાકિંકને મતે એ વિશ્વાસ અધવિશ્વાસ જ ગણાશે.

[૨]

જ્ઞાનપ્રાપ્તિનાં એ મૂળભૂત ઉપકરણ છે. ઇન્દ્રિયાનુભૂતિ તથા તદાધારિત વિચારશૃંખલા (= વિકલ્પશૃંખલા). બધીં એ નિર્વિવાદરૂપે સ્વીકારવું પડશે કે અર્થવિષયક ઇન્દ્રિયાનુભૂતિ-વિશેષનું કારણ હોય છે તે અર્થનો કોઈ ઇન્દ્રિયવિશેષની સાથે સન્નિકર્ષ^૧. પ્રશ્ન થાય છે કે ઇન્દ્રિયાનુભૂતિનો સ્વાધારિત વિચારશૃંખલાની સાથે સંબંધ કઈ જાતનો હોય છે. ટૂંકમાં આ પ્રશ્નનો ઉત્તર એ છે કે ઇન્દ્રિયાનુભૂતિ પર આધારિત (= તત્પ્રજ્ઞાવી) વિચારશૃંખલા સાક્ષાત્ એ અર્થવિશેષનો સ્વરૂપનિશ્ચય કરાવે છે, જે અર્થવિશેષનો ઇન્દ્રિયની સાથે સન્નિકર્ષ થતાં પરિણામે આ ઇન્દ્રિયાનુભૂતિનો જન્મ થયો હોય છે. પરંતુ પરંપરાથી તે વિચાર-શૃંખલા એ બધા જ અર્થોનો સ્વરૂપનિશ્ચય પણ કરાવી શકે છે, જે અર્થોની સાથે આ અર્થવિશેષનો કાર્યકારણસંબંધ ઉક્ત ઇન્દ્રિયાનુભૂતિના કર્તાને નિશ્ચિતરૂપે જ્ઞાત હોય. આ સમગ્ર પ્રક્રિયા પર કંઈક વિસ્તારથી વિચાર કરીએ. પ્રત્યેક ઇન્દ્રિયાનુભૂતિ તે અનુભૂતિના કર્તાને સ્વસદરા પૂર્વાનુભૂતિઓનું તથા તેમના દ્વારા તે અનુભૂતિઓના જનકભૂત (=વિષયભૂત) અર્થનું સ્મરણ કરાવવામાં ઓછેવત્ અંશે સમર્થ બને છે. અનુભૂતિકર્તા જાણે છે કે સદરા

૧. એક એવાય દાર્શનિકો થયા છે જેમણે બાહ્યાર્થની વાસ્તવિકતાનો ઇનકાર કરીનેય ઇન્દ્રિયાનુભૂતિઓની વાસ્તવિકતાનો સ્વીકાર કર્યો છે; પરંતુ વસ્તુતઃ ઇન્દ્રિયાનુભૂતિઓનું કાલ્પનિકત્વ બાહ્યાર્થની વાસ્તવિકતાને માન્યા વિના કોઈ પણ રીતે ઉપપન્ન નહિ થાય. આ જ એ મત કમરા: વિજ્ઞાનવાદ તથા બાહ્યાર્થવાદના મૂલ મતબંધ છે, અને વિજ્ઞાનવાદને નિરૂપણતક તથા બાહ્યાર્થવાદને સોપર્ણતક માનીને બધીં વિવેચન કરવામાં આવે છે.

અનુભૂતિઓનું કારણ હોય છે સદૃશ અર્થોના ઇન્દ્રિયની સાથે સન્નિકર્ષ, અને આવી વસ્તુ સ્થિતિ હોઈને વર્તમાન ઇન્દ્રિયાનુભૂતિના સમયે થનારું તત્સદૃશપૂર્વાનુભૂતિઓનું સ્મરણ અનુભૂતિકર્તાને એ નિશ્ચય પર લઈ જાય છે કે આ વર્તમાન ઇન્દ્રિયાનુભૂતિનો જનકભૂત (=વિષયભૂત) અર્થ પણ એવા સ્વરૂપવાળો જ હોવો જોઈએ એવા સ્વરૂપવાળો પેલી પૂર્વાનુભૂતિઓનો જનકભૂત (=વિષયભૂત) અર્થ હતો. આ રીતે સદૃશસ્વરૂપચળા અર્થના વિષયમાં ફરી ફરીને ચનારી ઇન્દ્રિયાનુભૂતિ અનુભૂતિકર્તાને એ અર્થોના સ્વરૂપનો અધિકાધિક નિશ્ચય કરાવવાને સમર્થ બને છે. આમ તો આ પ્રક્રિયા પ્રાણીમાત્રને સામાન્ય છે, પરંતુ મનુષ્યજાતિમાં તે પ્રોત્તરની પરાકાષ્ટાએ પહોંચી ગઈ છે; એનું મૂળભૂત કારણ છે મનુષ્યજાતિ દ્વારા ભાષાનો આવિષ્કાર. ભાષાની સહાયતાને કારણે મનુષ્યને માટે એ સંભવિત બને છે કે તે અર્થના સ્વરૂપ વિશેની એ બાબતોને પણ જાણી લે જે એના વ્યક્તિગત અનુભવનો વિષય કદાપિ બની ન હતી. આ કારણે જ કોઈ વર્તમાન અનુભૂત અર્થના વિશે એની સંજ્ઞા શી છે એનો નિશ્ચય બ્યારે મનુષ્ય કરે છે ત્યારે તેને એ અર્થના સ્વરૂપનો અધિકાધિક નિશ્ચય કરવા માટે એ વસ્તુની આવશ્યકતા નથી રહેતી કે તેણે એ અર્થના વિશે પોતાને થયેલી વ્યક્તિગત પૂર્વાનુભૂતિઓનું જ સ્મરણ કરવું; કારણ કે હવે તે તે સંજ્ઞાવાળા અર્થના વિષયમાં પોતાને થયેલી યાવત્ પ્રામાણિક જાણકારીનો—જેનો મોટો ભાગ તેને પ્રામાણિક પુરુષવચનોમાંથી પ્રાપ્ત થયો છે—ઉપયોગ એ અર્થના સ્વરૂપનો અધિકાધિક નિશ્ચય કરવા માટે કરી શકે છે. કોઈ અર્થવિશેષના સ્વરૂપનો નિશ્ચય કરવાને માટે બે બાબત જાણવી આવશ્યક છે: (૧) અર્થવિશેષની ઉત્પાદક કારણ-સામગ્રી શી છે, (૨) અર્થવિશેષ દ્વારા સંપાદિત કાર્યો કયાં કયાં છે. વસ્તુતઃ અનેક અર્થવિશેષોને એક સામાન્ય સંજ્ઞા આપીએ છીએ તેનો આધાર જ એ હોય છે કે તેમની ઉત્પાદક કારણ-સામગ્રી તથા એમના દ્વારા સંપાદિત કાર્યો એકસરખાં છે. અને જ્યાં સુધી જ્ઞાનપ્રાપ્તિની પ્રક્રિયાને લાગેવળગે છે ત્યાં સુધી આપણે કહી શકીએ કે અર્થ દ્વારા જનિત ઇન્દ્રિયાનુભૂતિઓ તે અર્થ દ્વારા જનિત કાર્યોમાં પ્રમુખસ્થાને રહે છે; કારણ કે અમુક એક અર્થ દ્વારા જનિત કેટલાય ઇન્દ્રિયાનુભૂતિઓના આધારે જ અનુભૂતિકર્તા એ અર્થની સંજ્ઞા નિશ્ચિત કરી લે છે, પછી બહેને એ સંજ્ઞાનિશ્ચય બાદ એને એ જાણવાની વિશેષ આવશ્યકતા ન રહે કે એ અર્થ બીજી કઈ કઈ ઇન્દ્રિયાનુભૂતિઓનો જનક છે.

આ રીતે વિચારવાથી આપણને ખ્યાલ આવે છે કે અમુક ઇન્દ્રિયસન્નિકૃષ્ટ અર્થના સ્વરૂપ વિશેના નિશ્ચયાત્મક જ્ઞાન તથા એ અર્થની સાથે કાર્યકારણભાવ ધરાવતા અર્થોના સ્વરૂપ વિશેના નિશ્ચયાત્મક જ્ઞાનની વચ્ચે કોઈ બહુ જાડી વિભાજનરેખા નથી. બૌદ્ધ તાર્કિકોની ભાષામાં કહીએ તો, અમુક અર્થના વિષયમાં પ્રત્યક્ષપૂજ્ઞાની વિકલ્પની સહાયતાથી ચનાર સ્વરૂપનિશ્ચય અને એ અર્થના કાર્ય-કારણના વિષયમાં કાર્યકારણભાવમૂલક અનુમાનની સહાયતાથી ચનાર સ્વરૂપનિશ્ચય બન્નેય તત્ત્વતઃ એક જ કોટિની પ્રક્રિયાઓ છે. પરંતુ તો પછી પ્રશ્ન ઊઠે છે કે બૌદ્ધ તાર્કિકોએ (કાર્યકારણભાવમૂલક) અનુમાનને પ્રમાણ તથા પ્રત્યક્ષપૂજ્ઞાની વિકલ્પને અપ્રમાણ કેમ માન્યું? “પ્રમાણ” શબ્દનો સીધો અર્થ હોવો જોઈએ “વસ્તુવિષયક અભ્યભિચારી જ્ઞાન” તથા “અપ્રમાણ” શબ્દનો ‘વસ્તુવિષયક અભિચારી જ્ઞાન’; આવું હોઈને પ્રત્યક્ષ-પૂજ્ઞાની વિકલ્પને અપ્રમાણ કહેવાનો આશય

એ થાય કે પ્રત્યક્ષપૃષ્ઠભાવી વિકલ્પની સહાયતાથી ચનાડું વસ્તુવિષયક જ્ઞાન અવિચલિત છે. પરંતુ બૌદ્ધ તાર્કિકોનો આવે અશય હોઈ શકે નહિ, કારણ કે તેમણે 'વસ્તુસ્વરૂપના નિશ્ચયક પ્રત્યક્ષપૃષ્ઠભાવી વિકલ્પ' અને 'વસ્તુસ્વરૂપના અનિશ્ચયક પ્રત્યક્ષપૃષ્ઠભાવી વિકલ્પ' વચ્ચે ભેદ પાડ્યો છે અને તે આ પ્રકારે છે: "જે કાર્યકારણભાવને જાણે અનેક અર્થ-વિશેષોને એક સંતાવિરોધ અપાય છે તે કાર્યકારણભાવની સમ્પન્ન અર્થને તે સંતા અપામવાર પ્રત્યક્ષપૃષ્ઠભાવી વિકલ્પ વસ્તુસ્વરૂપનો નિશ્ચયક છે અને એ કાર્યકારણભાવસ્થા અર્થને તે સંતા દેનાર પ્રત્યક્ષપૃષ્ઠભાવી વિકલ્પ વસ્તુસ્વરૂપનો અનિશ્ચયક છે." આથી એ સ્પષ્ટ થાય છે કે બૌદ્ધ તાર્કિકોએ પ્રત્યક્ષપૃષ્ઠભાવી વિકલ્પને કોઈ બીજા અર્થમાં અપ્રમાણ કહ્યો છે; એ અર્થ ઉપર ચોડાક વિચાર કરી લઈએ. આપણે જોયું કે બૌદ્ધ તાર્કિકોએ ઇન્દ્રિયાર્થ-જ્ઞાનિકર્પજન્ય અર્થવિષયક ઇન્દ્રિયાનુભૂતિને જ "પ્રત્યક્ષપ્રમાણ" સંતા આપી છે, પરંતુ વસ્તુતઃ પ્રમાણ-અપ્રમાણનો ભેદ નિશ્ચયકારી જ્ઞાનોની વચ્ચે જ કરી શકાય જ્યારે ઇન્દ્રિયાનુભૂતિ એ કોઈ નિશ્ચયકારી જ્ઞાન નથી. પ્રકારાન્તરથી બૌદ્ધ તાર્કિકોએ આ કડીકત્તો સ્વીકાર પણ કર્યો છે, કારણ કે એમની એવી માન્યતા છે કે અર્થ પ્રત્યક્ષનો વિષય સર્વોત્ક્રાંતિસ્વરૂપની અને શબ્દસંકેતનો વિષય અમુકોત્ક્રાંતિસ્વરૂપની અને છે; પરંતુ આનો અર્થ એ થયો કે અર્થના વિશે પ્રત્યક્ષ વધુમાં વધુ એટલું જ્ઞાન કરારી શકે કે અમુક દેશ-કાલમાં એ અર્થનું અસ્તિત્વ છે જ્યારે એ અર્થના અમુક ધર્મ(=પ્રકાર)ના વિશેનું જ્ઞાન કરવાને માટે આપણે અમુક શબ્દસંકેતનો આશરો લેવો પડશે. બૌદ્ધ તાર્કિકો આની લીધું કે જેમ અમુક શબ્દસંકેત અર્થના અમુક ધર્મનું જાપન કરાવે છે અને તે દ્વારા એ અર્થની એ ધર્મશૂન્ય અથવા જ અર્થોથી જે વ્યવહાર તેનું જાપન કરાવે છે, તેવી જ રીતે પ્રત્યક્ષ એ અર્થની સ્વેતર સમસ્ત અર્થોથી જે વ્યવહાર તેનું જાપન કરાવે છે અને તે દ્વારા એ અર્થના સ્વગત સમસ્ત ધર્મોનું જાપન કરાવે છે. આ સમજ સ્પષ્ટતઃ જ્ઞાન્ત છે અને એનું કંઈક જ્ઞાન સ્વયં બૌદ્ધ તાર્કિકોને હતું; એટલે જ તો એમણે પ્રત્યક્ષ દ્વારા થનાર અર્થના સર્વધર્મવિષયક જ્ઞાનને એ ધર્મોનું દર્શન કહ્યું તથા અમુક શબ્દસંકેત દ્વારા થનાર એ અર્થના અમુક ધર્મવિષયક જ્ઞાનને એ ધર્મોનો નિશ્ચય કહ્યો. પરંતુ એ તો નિઃશંક છે કે પોતાની આ જ્ઞાન્ત સમજને લઈને બૌદ્ધ તાર્કિકોએ પ્રત્યક્ષપૃષ્ઠભાવી વિકલ્પને અપ્રમાણ જાહેર કર્યો છે; કારણ કે એમણે એમ વિચાર્યું કે જ્યારે અર્થના સમસ્ત ધર્મોનું જ્ઞાન (=દર્શનાત્મક જ્ઞાન) પ્રત્યક્ષ કરાવી જ દે છે તો પછી પ્રત્યક્ષપૃષ્ઠભાવી વિકલ્પ દ્વારા થનારું એ અર્થના અમુક ધર્મોનું જ્ઞાન (=નિશ્ચયાત્મક જ્ઞાન) પિછપેપણ હોઈને પ્રમાણ કેમ લેખી શકાય? પરંતુ હમણું જ આપણે જોયું તેમ, પ્રમાણ-અપ્રમાણનો ભેદ નિશ્ચયકારી જ્ઞાનોની વચ્ચે જ કરી શકાય, જ્યારે ઇન્દ્રિયાનુભૂતિ એ કોઈ નિશ્ચયકારી જ્ઞાન નથી; આવી પરિસ્થિતિમાં બૌદ્ધ તાર્કિકોએ ઇન્દ્રિયા-

૨. શબ્દસંકેત દ્વારા થનારા અર્થવિષયક જ્ઞાનને પ્રમાણકોટિમાં (જેહ કે પ્રમાણકોટિની સમીપ) લાવવાના ઉદ્દેશથી એની શૃંગીનશક્તિને દૂર કરવાનો પ્રયત્ન પણ બૌદ્ધ તાર્કિકોએ કર્યો છે. ઉદાહરણરૂપે, એમણે કહ્યું કે પ્રત્યક્ષ અને શબ્દસંકેત બન્ને અર્થ વિશે જ જ્ઞાન કરાવે છે, ફેર આત્ર એટલો જ કે પ્રત્યક્ષ તેનું જ્ઞાન વિધિરૂપથી કરાવે છે જ્યારે શબ્દસંકેત તેનું જ્ઞાન અતદ્વ્યવહારરૂપે કરાવે છે. પરંતુ જ્યારે બૌદ્ધ તાર્કિકોને મતે વિભિન્ન અર્થોને એક શબ્દથી અભિહિત કરવાનું કારણ તે અર્થોનો શબ્દ કાર્યકારણભાવ છે તો પછી શબ્દસંકેત દ્વારા થનારું અર્થવિષયક જ્ઞાન વિધિરૂપ નહિ પણ માત્ર અતદ્વ્યવહારરૂપ એ કઈ રીતે અને?

નુર્વર્તને પ્રત્યક્ષ પ્રમાણ્ય કહેવી અને 'પ્રત્યક્ષપુરુષાવી વિવેકમને અ-પ્રમાણ્ય. કહેવો એ તો વસ્તુનિર્ણયિને આપ કોઢી નેજા ચરાખર છે. જ્ઞાનપ્રાપ્તિની પ્રક્રિયામાં ઇન્દ્રિયાનુભૂતિ એક વિવેકમપૂર્ણજાતી સોપાન હોઈને એને નિર્વિવેકપદ કહેવી એ તો ઠીક જ છે, પરંતુ એની એ નિર્વિવેકપદતાને કારણે એને "પ્રમાણ્ય" જાહેરાતી જ નહિ પણ એ જાહેરાતી યોગ્યતાથી પણ વંચિત રહેવું પડશે. જો તાર્કિકોએ નિર્વિવેકપદ જ્ઞાનને પ્રમાણ્ય રીતે પ્રમાણ્ય નહિ માન્યને યોગ્ય જ કહ્યું છે, તથા સાર્વજનિક આજ દરિદ્રાણ્ય ન્યાયવેશિષ્ટિ અને જીર્ણાશ્રમ તાર્કિકોનો હોમ એમ જાણે છે. હા, ગમેશે "જ્ઞાનાકરણકે જ્ઞાન"ને અને હેમચંદ્રે "પ્રમાણ્ય-નિરપેક્ષ જ્ઞાન"ને પ્રત્યક્ષના લક્ષણરૂપે પ્રસ્તુત કયું તેમાં નિર્વિવેકપદ જ્ઞાન જ પ્રત્યક્ષ પ્રમાણ્ય છે એ બૌદ્ધ સિદ્ધાંતનો પ્રજાવ વસ્તુતઃ છે; પરંતુ આપણે જોયું તેમ, ગમેશે અને હેમચંદ્રના આ લક્ષણો સવિવેકપદ પ્રત્યક્ષને લાગુ પડતાં ન હોઈને પ્રત્યક્ષ પ્રમાણ્યનાં એ નિર્દોષ લક્ષણો ન આપી શકે. આ રીતે અકલંક આદિ જોન તાર્કિકોએ "સ્ફુટ અથવા વિશદ જ્ઞાન"ને પ્રત્યક્ષના લક્ષણરૂપે આપ્યું તેમાં બૌદ્ધ પરંપરાનો પ્રજાવ છે; પરંતુ ઇન્દ્રિયાનુભૂતિને જ પ્રમાણ્ય માનનાર એમ કહી શકે કે પ્રત્યક્ષ (=નિર્વિવેકપદ) જ્ઞાન સ્ફુટ અથવા વિશદ કોટિનું અને પ્રત્યક્ષેતર (=સવિવેકપદ) જ્ઞાન અસ્ફુટ અથવા અ-વિશદ કોટિનું હોય છે, જ્યારે પ્રત્યક્ષ તથા પ્રત્યક્ષેતર બન્નેય પ્રકારના જ્ઞાન (પ્રમાણ્યજ્ઞ જ્ઞાન)ને સવિવેકપદ માનનાર અકલંક વગેરે જોન તાર્કિકો એમ ન કહી શકે કે પ્રત્યક્ષ જ્ઞાન સ્ફુટ અથવા વિશદ કોટિનું હોય છે અને પ્રત્યક્ષેતર જ્ઞાન અસ્ફુટ અથવા અ-વિશદ કોટિનું. આ કારણે જ "સ્ફુટ અથવા વિશદ જ્ઞાન"ને પ્રત્યક્ષના લક્ષણરૂપે પ્રસ્તુત કર્યા પછી જોન તાર્કિકોનાં સમક્ષ "સ્ફુટતા અથવા વિશદતા"નું લક્ષણ કરવાનાં સમસ્યા બની ચ.૫ છે; ઉદાહરણરૂપે, હેમચંદ્ર દ્વારા ઉપચર્યાગિત ઉપધુક્તા એ પ્રત્યક્ષ લક્ષણો વસ્તુતઃ "વૈશદ્ય"નાં લક્ષણ છે, જ્યારે પ્રત્યક્ષનું લક્ષણ તો હેમચંદ્રે "વિશદ જ્ઞાન" જ કહ્યું છે.

અહીં એ પ્રશ્ન થવો સ્વાભાવિક છે કે બૌદ્ધ તાર્કિકોએ અર્થવિવેક નિર્વિવેકપદ પ્રત્યક્ષને એ અર્થના સમસ્ત ધર્મોનું સાક્ષાત્ જ્ઞાન કરાવનારું કેમ જાહેર કયું?—બને ને એનો અર્થ ગમે તે કેમ ન હોય. આ પ્રશ્નનો નિર્વિવાદ ઉત્તર આપવો મુશ્કેલ છે. એમ લાગે છે કે એ તાર્કિકોએ કોઈ પણ સવિવેકપદ પ્રમાણ્યમાં એવી યોગ્યતા ન જોઈ—અને યરાખર રીતે જ—જે અર્થવિશેષના સમસ્ત ધર્મોનું જ્ઞાન કરાવી શકે (જોકે એમણે અનુમાન—તથા પ્રામાણિક પુરુષવચન—માં એવી યોગ્યતા અવશ્ય જોઈ કે જેને લઈને તે અર્થ-વિશેષના અધિકાધિક ધર્મોનું જ્ઞાન કરાવતું રહે. અને આ તેમની વાત ઠીક પણ છે); પરંતુ સાથે સાથે એ તાર્કિકોએ એમ વિચાર્યું—અને ખોટી રીતે—કે એવું કોઈ પ્રમાણ્ય અવશ્ય હોવું જોઈએ જે એક અર્થવિશેષના સમસ્ત ધર્મોનું જ્ઞાન કરાવી શકે. બીજી બાજુ, જોન તથા ન્યાય-વેશિષ્ટિ તાર્કિકોની જેમ એ બૌદ્ધ તાર્કિકોને એવો પણ વિશ્વાસ હતો કે યોગ્યજ્ઞાન દ્વારા અર્થવિશેષના એવા ધર્મોનો અવગતિય સંબંધ છે, જે ઇન્દ્રિયાત્મક જ નહિ અનુમાનાત્મક પણ છે. એટલું જ નહિ, પોતે મહામાની બૌદ્ધ હોઈને એ તાર્કિકોને એવા પણ વિશ્વાસ રહ્યો હતો કે યોગ્યજ્ઞાન દ્વારા—અને યોગ્યજ્ઞાન દ્વારા જ—પરમાર્થસત્ત્વી અવગતિ સંબંધ છે, જેનો અર્થ પ્રમાણ્યશાસ્ત્રોપયોગી બારામાં એમ થાય કે યોગ્યજ્ઞાન દ્વારા—તથા યોગ્યજ્ઞાન દ્વારા જ—સઘળા અર્થોના સઘળા ધર્મોની અવગતિ સંબંધ છે. કદાચ આ સમસ્ત

પ્રત્યક્ષમાં બોદ તાર્કિકાએ ધોષણા કરી કે અર્થવિષયક ઇન્દ્રિયજ નિર્વિકલ્પક જ્ઞાન તે અર્થના સ્વરૂપા ધર્મેનું જ્ઞાપક છે, જેવી રીતે યોગશક્તિજન્ય નિર્વિકલ્પક જ્ઞાન સ્વરૂપા અર્થોના સ્વરૂપા ધર્મેનું જ્ઞાપક છે. આપણા મુખ્યદુઃખાદિ મનોભાવોનું જ્ઞાન આપણને અત્યાસરે, પરંતુ અસદિચ્છપણે ઘટી જાય છે એ હકીકતે પણ બોદ તાર્કિકાને એમ વિચારવા પ્રેર્યા હશે કે અર્થવિષયક ઇન્દ્રિયજ નિર્વિકલ્પક જ્ઞાન તે અર્થના સ્વરૂપ (સ્વરૂપ સ્વરૂપ)નું નિઃસદિચ્છભાવે જ્ઞાપક છે, જેવી રીતે આપણા પોતાના મુખ્યદુઃખાદિ મનોભાવોના વિષયમાં આપણને થનારું નિર્વિકલ્પક (=અત્યાસરિચ્છ) જ્ઞાન એ મનોભાવોના સ્વરૂપનું નિઃસદિચ્છભાવે જ્ઞાપક છે. આમ યોગિજ્ઞાનને તથા મનોભાવવિષયક સ્વસંવેદનને નિર્વિકલ્પક, નિઃસદિચ્છ તેમ જ સ્વમત્સ્વરૂપવિષયક કોટિના જ્ઞાનો માની બોદ તાર્કિકાએ કલ્પના કરી કે અમુક અર્થના વિષયમાં થનારું ઇન્દ્રિયજ નિર્વિકલ્પક જ્ઞાન પણ એ અર્થના સ્વમત્સ્વરૂપને વિષય કરતું પ્રમાણભૂત જ્ઞાન છે. આધુનિક તાર્કિક કહેશે કે આ સમસ્ત તર્કજ્ઞાને માટે બોદ તાર્કિકાના યોગિજ્ઞાનની સંભાવનામાં રહેલા અધવિશ્વાસને અને મનોભાવોના વિષયમાં તેમની અધૂરી સમજને જવાબદાર ગણવા જોઈએ. બોદ તાર્કિકાએ 'કલ્પનાપોઠ (=નિર્વિકલ્પક) જ્ઞાન'ને પ્રત્યક્ષનું લક્ષણ ગણ્યું છે તથા તેમણે પ્રત્યક્ષના ચાર પ્રકાર માન્યા છે: (૧) ઇન્દ્રિયજ, (૨) સ્વસંવેદન, (૩) યોગજ, (૪) માનસ. માનસપ્રત્યક્ષની કલ્પના આધુનિક માનસશાસ્ત્ર દ્વારા કલ્પિત after-cognition જેવી છે, અને જે કારણેને લઈને after-cognition-ને Perceptionનો પ્રકાર વિશેષ નથી ગણવામાં આવતો તે જ કારણેને લઈને આ માનસપ્રત્યક્ષને પ્રત્યક્ષનો પ્રકારવિશેષ ન માનવો જોઈએ. જેન તાર્કિકા પ્રત્યક્ષના બે પ્રકાર માને છે: (૧) મુખ્ય, (૨) સાંઘવહારિક. મુખ્ય પ્રત્યક્ષમાં અવધિ, મનઃપર્યાય અને કેવલ (=ત્રિવિધ યોગિજ્ઞાન)નો સમાવેશ થાય છે, તથા સાંઘવહારિક પ્રત્યક્ષમાં ઇન્દ્રિયજ જ્ઞાન આવે છે. ગંગેશ પ્રત્યક્ષના બે પ્રકાર સ્વીકાર્યા છે: (૧) લૌકિક, (૨) અલૌકિક. લૌકિક પ્રત્યક્ષમાં ઇન્દ્રિયજ જ્ઞાન આવે છે અને અલૌકિક પ્રત્યક્ષના ત્રણ ભેદ પડે છે: (અ) સામાન્યલક્ષણ, (બ) જ્ઞાનલક્ષણ, (ક) યોગજ. સામાન્યલક્ષણ તથા જ્ઞાનલક્ષણ પ્રત્યક્ષોની ગંગેશની કલ્પના નિરાળી છે. અમુક એક વસ્તુવિશેષવિષયક લૌકિક પ્રત્યક્ષને પરિણામે ઉત્પન્ન થનારું તંજનતીય સ્વધર્મી વસ્તુઓને વિષય કરનારું અલૌકિક પ્રત્યક્ષ સામાન્યલક્ષણપ્રત્યક્ષ છે, તથા અમુક ઇન્દ્રિયવિશેષથી સન્નિવૃત્ત વસ્તુના તે ઇન્દ્રિય દ્વારા પ્રકલ્પ્યોગ્ય નહિ એવા ધર્મવિશેષનું થનારું અલૌકિક પ્રત્યક્ષ તે જ્ઞાનલક્ષણપ્રત્યક્ષ છે (કારણ કે આ પ્રત્યક્ષનું નિમિત્ત છે એ વસ્તુના એ ધર્મવિશેષના વિષયનું થનારું ઇષ્ટ પ્રમાતાનું પૂર્વાનુભૂત જ્ઞાન). જેને આધુનિક માનસશાસ્ત્રમાં apperceptionની ઘટના કહેવામાં આવે છે તે ઘટનાની ઉપપત્તિ કરવા ગંગેશ જ્ઞાનલક્ષણ-પ્રત્યક્ષની કલ્પના કરી છે.^૩ કહેવાની જરૂર નથી કે આ બન્ને પ્રકારોના અલૌકિક પ્રત્યક્ષની કલ્પના તર્કસંગત નથી.

^૩ બીજા કેટલાંક એવા જ્ઞાનોને પણ જ્ઞાનલક્ષણપ્રત્યક્ષના ઉદાહરણ માનવામાં આવ્યાં છે જેમાં ઇન્દ્રિયધર્મસન્નિવૃત્ત વિના જ ઇષ્ટ પ્રમાતાના કોઈ પૂર્વાનુભૂત જ્ઞાનોના ઉપયોગ થાય છે. "જ્ઞાનાકરણક જ્ઞાન" આ પ્રત્યક્ષલક્ષણને જ્ઞાનલક્ષણપ્રત્યક્ષ પર લાગુ કરતું કેટલું કઠણ છે તે તો સ્પષ્ટ છે.

પરિશિષ્ટ

ઉપર નામવેરોવિત, જેન, તથા મીમાંસા તાકિંકેનાં મંતવ્યોના વિશે એ કંઈ સમીક્ષા કરવામાં આવી છે તેના સમર્થનમાં મૂળ ગ્રંથોના ઉદરણની માર્ગ ખાસ આવશ્યકતા નથી. પરંતુ મોટા તાકિંકેનાં મંતવ્યોને વિશે આમ ન કહી શકાય — કેમ કે એ તાકિંકેનાં એ દુર્લાભ હવે કે તેઓ મહાયાની અને તાકિંકે બન્નેમ હતા જેને હવેને માહાયાનીઓએ એવે સંદેહની નજરે એટલા માટે જોયા કે તેઓ તાકિંકે હતા અને તાકિંકેએ એટલા માટે કે તેઓ મહાયાની (એટલે કે વિદ્યાનવાદી અથવા શૂન્યવાદી) હતા. એટલે જ નીચે કર્મકાર્તિના સ્વોપપત્તિવાળા પ્રમાણ્યુવાર્તિકમાંથી કેટલાંક (તથા મનોરથનન્દિકૃત પ્રમાણ્યુવાર્તિક ટીકામાંથી એક) એવાં ઉદરણો આપીએ છીએ, જેમનાથી અહીં કરવામાં આવેલ સમીક્ષાને સમર્થન મળી શકે :

(૧) શબ્દસંકેતને અર્થો ઉપર લાગુ કરવાની પ્રક્રિયા

(I) તસ્માદિમે ભાવાઃ સ્વજાતીયાભિમતાદ અન્યસ્માદ્ ધ્વતિરિક્તાઃ, સ્વભાવેનૈકરૂપ-ત્વાત્ । યતો યતો મિન્નાસ્તદ્ભેદપ્રત્યાયનાય કૃતસંનિવેશૌઃ શબ્દૈઃ સતસ્તતો મેદમુપાદાય સ્વભાવામેદેડવ્યનેકધર્માનઃ પ્રતીયન્તે । ... તસ્માદેકસ્ય ભાવસ્ય યાવન્તિ પરરૂપાણિ તાવત્યસ્તદપેક્ષયા વ્યાવૃત્તયઃ, તદસંભવિકાર્યકારણસ્ય તદ્ભેદાત્ । યાવત્યથ તદ્વ્યાવૃત્તયઃ તાવત્યથ ધ્રુતયોડતત્કાર્યકારણપરિહારેણ વ્યવહારાર્યાઃ । ... તસ્માત્ સ્વભાવામેદેડપિ યેન ધર્મેણ નામ્ના યો વિશેષો મેદઃ પ્રતીયતે ન સ શક્યોડન્યેન પ્રત્યાયચિત્તુમિતિ નૈકાર્ષાઃ સર્વશબ્દાઃ । (પૃ. ૧૬)

(II) યે સમસ્તાઃ કિંચિદેકં કાર્યં કુર્વન્તિ તેષાં તત્ર વિશેષાભાવાદ્ અપાર્થા વિશેષબોધનેતિ સક્તૃ સર્વેષાં નિયોજનાર્થમેકમયં લોકઃ શબ્દં તેષુ નિયુક્તે ષટ્ ઇતિ તેડપિ સજાતીયાદન્વતથ મેદાવિશેષેડપિ તત્પ્રયોજનાજ્ઞતયા તદન્યેભ્યો મિશ્રન્તે ઇતિ અમેદાત્ તતોડવિશેષેણ પ્રતીયન્તે ।* (પૃ. ૪૪)

(III) તસ્માત્ સિદ્ધમેતત્ — શર્વે શબ્દાઃ વિવેકવિષયાઃ વિકલ્પાથ । એતે એકવસ્તુ-પ્રતિશરણા અપિ યથાસ્વમવધિમેદોપકલ્પિતર્થેદૈઃ મિન્નેષ્વિવ પ્રતિભાસ્તુ બુદ્ધૌ વિવેકેષૂપસ્થા-પનાદ્ મિન્નવિષયા એવ । (પૃ. ૬૧)

(૨) શબ્દસંકેતજન્ય જ્ઞાન પણ અશુદ્ધ અર્થમાં શુદ્ધિતઆહી નથી (જેમ અનુમાનજન્ય જ્ઞાન શુદ્ધિતઆહી નથી તેમ).

કથં પુનરેતદ્ ગમ્યતે — વ્યવસ્થેદઃ શબ્દલિલ્ગાભ્યાં પ્રતિપાશતે વિચિના ન વસ્તુ-રૂપમેવંતિ । પ્રમાણાન્તરસ્ય શબ્દાન્તરસ્ય ચ પ્રવૃત્તેઃ । તથાહિ —

એકસ્વાર્થસ્વભાવસ્ય પ્રત્યક્ષસ્ય સતઃ સ્વચચ્ ।

કોડન્યો ન હૃષ્ટો માગઃ સ્યાચ્ઃ પ્રમાણૈઃ પરીક્ષયતે ॥ ૪૫ ॥

તસ્માદ્ હૃષ્ટસ્ય માવસ્ય હૃષ્ટ એવાશિલો ગુણઃ ।

પ્રાન્તેનિચીયતે મેતિ સાધનં સંપ્રવર્તતે ॥ ૪૭ ॥

(પૃ. ૧૭)

*અહીં પુષ્કાકે માર્ગવિશ્વવિદ્યાલય દ્વારા પ્રકાશિત સંસ્કૃત (સંપાદકઃ પં. કલ્યાણ માલવજિયા)ના છે.

- (2) प्रत्यक्ष ज्ञान सर्वदृशी होवा कारण सर्वनिश्चायक नवी तथा हेतु पक्ष निश्चायक ज्ञान सर्वनिश्चायक नवी. (आ संप्रधानं (२) पक्ष ज्ञानं ज्ञेयं.)

यद्यप्यंशरहितः सर्वतो भिन्नत्वभावोऽनुभूतः तथापि न सर्वतोऽपि तावत् निश्चयो
भवति कारणान्तरापेक्षत्वात् । अनुभवो हि यथाविकल्पमभ्यासे निश्चयप्रत्ययान् जनयति ।
यथा रूपवर्णानां विशेषेऽपि कुणव-कामिनी-भयविकल्पान्तोऽपि यथाविकल्पोऽस्ति
आन्तिकारणे भवति । . . . न प्रत्यक्षं कस्यचिन्निश्चयवत्कम् । तद् वमपि सूचति तत्र निश्चयैव
किं तर्हि ? तत्प्रतिभासेन । तत्र निश्चयानिश्चयवशात् प्रत्यक्षत्वं प्रवृत्तमव्यये । नैवं निश्चयानां,
किञ्चिन्निश्चयवन्तोऽप्यन्यत्रानिश्चयेन प्रवृत्तिमेदाद् प्रवृत्ताप्रवृत्तम् । (टि. २०)

- (૪) પ્રત્યક્ષની જેમ અનુમાન સાક્ષાત્ અર્થજન્ય ન હોવા છતાં પ્રત્યક્ષની જેમ જ પ્રમાણુ કઈ રીતે?

एते कार्यस्वभावानुपलब्धिलक्षणयोगोहेतवः ।... .. तत्र द्वौ वस्तुसाधनावेकः प्रतिषेधहेतुः ।... .. एतौ द्वावनुमेयप्रत्ययौ साक्षादनुत्पत्तेरतत्प्रतिभासित्वेऽपि तदुत्पत्तेस्तदव्यभिचारिणाविति प्रमाणं प्रत्यक्षवत् । प्रत्यक्षस्यापि श्रान्त्यव्यभिचार एव प्रामाण्यम्, तदभावे भाषितस्तद्विप्रलम्भात् । अव्यभिचारश्चान्यस्य कोऽन्यस्तदुत्पत्तेः । अनायत्तरूपाणां सहभावनियमाभावात् । (पृ० २)

- (૫) પ્રત્યક્ષપૃષ્ઠભાવી વિકલ્પ કયા અર્થમાં અ-પ્રમાણ ?

गृहीतग्रहणान्नेष्टं सांवृतम् (प्र. वा. १/५) गृहीतग्रहणान्नेष्टं सांवृतं दर्शनोत्तरकालं सांवृतं विकल्पज्ञानं प्रमाणं नेष्टं दर्शनगृहीतस्यैव ग्रहणात् तेनैव च प्रापयितुं शक्यत्वात् सांवृतमकिञ्चित्करमेव । मनोरथ

- (१) पुण्यवचनानुं प्राभास्य केन्द्री लङ् मुधी तस्य धार्मिक आगमोनुं स्वतंत्र प्राभास्य कया विषयेमां ?

न हि शब्दा यथाभावं वर्तन्ते यतस्तेभ्योऽर्थप्रकृतिर्निष्पद्येत । ते हि वक्षुर्विबुद्धादृतय इति तज्ज्ञानरीयास्तामेव गमयेयुः । न च पुरुषेच्छाः सर्वा यथार्थभाविन्यः । न च तदप्रतिबद्धस्वभावो भावोऽन्यं गमयति ।

यस्यहृदिम् —

“आत्मवादाऽविसंवादसामान्वादानुमानता” [का० २१९] इत्यात्मसंस्थानुमानत्व-
मुक्तं तत्कथम् ? नायं पुरुषोऽनाश्रित्यागमप्रामाण्यमावितुं समर्थोऽत्यक्तत्वज्ञानं केवाश्रित्य
प्रवृत्तिनिवृत्त्योर्महानुतांसाऽपामश्रयणात्, तद्वामये विरोधादर्शनात् । तस्मिन् प्रवर्तितव्ये
वरमेवं प्रवृत्त इति परीक्षया प्रामाण्यमसह । (५०-७१-७२)

Summary

The Jaina logicians and the later Naiyāyikas defined perception as the knowledge that is vivid or as the knowledge that has no other knowledge for its special cause (Karaṇa), because they wanted to formulate a general definition of perception applicable to both akṣaja-jñāna and yogi-jñāna. But these definitions are defective as they are not applicable to savikalpaka pratyakṣa the possibility of which is recognised by the logicians of both the schools. Gaṅgeśa is conscious of this and hence he observes silence on the role of memory in the generation of perception. An analysis of the process of the generation of perception gives us four stages :

(1) sense-object-contact, (2) experience of the object, (3) revival of particular memory traces, and (4) determinate knowledge of the object. All the Indian logicians recognise these four stages but they differ on the question of naming the second and the fourth stages. The Buddhist logicians reserve the term 'pratyakṣa' for the second stage and call the fourth one 'pratyakṣa-pṛṣṭhabhāvivikalpa'; the Jaina logicians apply the term 'dars'ana' and 'pratyakṣa' to the second and the fourth stages respectively; the Naiyāyikas and the Mīmāṃsakas give the name 'nirvikalpaka pratyakṣa' to the second stage while the fourth one is termed 'savikalpaka pratyakṣa'. This type of terminological difference is not rare even among the modern psychologists.

There are mainly two methods of acquiring knowledge—experience and thought. Thought first determines the nature of the very object that has given rise to experience, and this thought afterwards can even determine the objects that are either the cause or the effects of the object experienced. To use Buddhist terminology, thought in its first capacity is 'pratyakṣapṛṣṭhabhāvivikalpa' (=thought arising in the wake of experience) and thought in its second capacity is anumāna (=inference). It is not easy to draw a fine line of distinction between the two. Yet, the Buddhist logicians treat the former

as *apramāṇa* and the latter as *pramāṇa*. But this does not mean that they consider the former to be contradictory. They call it *apramāṇa* in some other sense. It is *apramāṇa* because it cognises what has already been cognised by experience (= Buddhist perception). The Buddhist logicians believe that experience cognises all the attributes of the thing; on the basis of this belief they maintain that there remains nothing to be cognised by thought arising in the wake of experience. But this view is not correct. In fact the question of *prāmāṇya* arises in the case of determinate knowledge only and experience is not determinate knowledge; this is accepted by the Jaina logicians, and the Naiyāyikas and the Mīmāṃsakas tacitly recognise this position. The Buddhist logicians too indirectly consider experience to be an indeterminate knowledge. This is the reason why they give the name 'darsana' to experience and 'niscaya' to thought arising in its wake. Moreover, experience really cognises the bare existence of the thing at a particular spatio-temporal point while thought arising in its wake cognises the attributes of that thing. Hence, thought arising in the wake of experience assumes the status of *pramāṇa* even on the Buddhist criterion of *agñitagrāhitva*. Types of perception recognised by different systems are further discussed in the article.

ભારતીય ઇતિહાસના કહેવાતા અંધકાર યુગો

ભાગ ૧

ડૉ. ર. કે. ધાર્યા

(ઇતિહાસ વિભાગ, સમાજવિદ્યા ભવન, ગુજરાત યુનિવર્સિટી)

નંદ યુગ

અંધકાર યુગોનું મહત્ત્વ

ભારતીય ઇતિહાસમાં કમનસીબે કહેવાતા કેટલાક અંધકાર યુગો છે. જેમાં વિષે અપમાનિત, શંકાસ્પીષ કે પરસ્પર વિરોધી માહિતી મળતી હોય છે તેવા યુગોને સામાન્ય રીતે ઇતિહાસના અંધકાર યુગો કહેવામાં આવે છે. આ રીતે વિચારતાં છેક મૌર્ય સમયના પ્રારંભ સુધીનો પ્રાચીન ભારતીય ઇતિહાસ એક પ્રકારનો અંધકાર યુગ કરી શકાય. મૌર્ય યુગની શરૂઆતથી (ઈ.સ. પૂર્વે ૩૨૪^૧) હિન્દુ સમયના અંત (આશરે ઈ.સ. ૧૨૦૦) સુધીના ગાળામાં પણ આવા કેટલાક અંધકાર યુગો પડેલા છે. તેઓએ ઇતિહાસના ઘડનારમાં ભજવેલા લાભ વિષે મોટે ભાગે દુર્લક્ષ સેવાયું છે અથવા તેમનું નેહનું સૂચનાકન થયેલું નથી તેમ લાગે છે. મૌર્ય સામ્રાજ્યના વિસ્તાર, તેની શાસનવ્યવસ્થાની સંગીનતા તથા તેના સમયની વિવિધ ક્ષેત્રોની પ્રગતિમાં નંદ શાસનકાળનો ફાળો નમણ્ય નથી. વાકાટક યુગના સાંસ્કૃતિક વિકાસમાં સાતવાહન રાજવીઓનો હિસ્સો ખાસ નોંધપાત્ર છે. ગુપ્ત સમયની વિવિધ ક્ષેત્રોની ઉન્નતિમાં નાગભારતીય શાસકોએ પ્રાદાણ્ય ધર્મના પુનરુત્થાનને આપેલો વેશ ભૂલપા જેવો નથી. મૌખરીઓએ આપેલા રાજકીય વારસાને લીધે હર્ષનું ઉત્થાન ઝડપી બન્યું હતું. તેવી જ રીતે મધ્યયુગનાં ધણીખરાં રાજપૂત રાજ્યોનું અસ્તિત્વ ગુર્જર-પ્રતિહાર યુગને આભારી હતું.^૨ પરિણામે આવા કહેવાતા અંધકાર યુગોનું સ્પષ્ટ આલેખન ઇતિહાસની કેટલીક ખૂટતી કડીઓ જોડવા માટે પણ અનિવાર્ય ગણાય. અલબત્ત, તેમાં જોઈએ તેટલી અને જોઈએ તેવી સાધનસામગ્રી મળતી નથી તે નિર્વિવાદ છે, પરંતુ જે પ્રાપ્ય છે તેટલાનો પણ મોઝ રીસનો ઉપયોગ કરવાથી જે તે યુગો તથા તેમના પુરોગામી અને અનુગામી યુગો પર પણ સારો એવો પ્રકાશ પડે છે તે નિઃશંક છે. પ્રાચીન ભારતને લગતી ધણીખરી સાહિત્યિક સામગ્રી પૂરતી શ્રદ્ધે ન હોવા છતાં અશ્રદ્ધે તથા શંકાસ્પીષ જ છે તેમ માની લેવાને કારણ નથી. તેનો આભિલેખિક તથા અન્ય સમકાલીન પુરાવા સાથે તુલનાત્મક

^૧ (a) *Indian Historical Quarterly*, (I.H.Q.) XI, p. 211.

(b) *Political History of A India*, p. 295 (PHAI), H. C. Raychaudhary 6th Ed.

^૨ *The Age of Imperial Kanauj*, Vol. IV, pp. 240-41.

અભ્યાસ કરવાથી તેની ઉપયોગિતા, કમ-ઉપયોગિતા કે બિન-ઉપયોગિતા સિદ્ધ થઈ શકે છે. આ વિવરણના અનુસંધાનમાં નંદ શાસનકાળનું મૂલ્યાંકન થવું પડે.

નંદ યુગને લગતી સાધનસામગ્રી

નંદ યુગને લગતી સાધનસામગ્રી અદ્ય હોવા છતાંયે તેના તુલનાત્મક અધ્યયન બાદ તે અશ્વદેય ઠરતી નથી, પુરાણો,^૩ બૌદ્ધ સાહિત્ય,^૪ જૈન ગ્રંથો,^૫ ગ્રીક લેખકોના નિર્દેશો,^૬ કોટિલ્કનું અર્થશાસ્ત્ર વગેરેમાંથી એકબીજાને મહદઅંશે પૂરક કહી શકાય તેવી માહિતી મળે છે. જૈન રાજવી ખારવેલનો ઉદયગિરિનો હાથીગુહાનો લેખ^૭ પણ પ્રથમ નંદ શાસકનાં લોકોપયોગી કાર્યોના નિર્દેશ કરે છે. બાણુ તથા હુનસંગ પણ નંદ શાસકો તથા તેમની શાસનવ્યવસ્થાનો ઉલ્લેખ કરે છે. ડૉ. નીલકંઠ શાસ્ત્રી,^૮ ડૉ. હેમચંદ્ર રાય ચૌધરી,^૯ રો. આર. સી. મજુમદાર^{૧૦} વગેરે આધુનિક વિદ્વાનોએ પણ ઉપરોક્ત સાધનોને આધારે નંદોનું કુલ, તેમના રાજ્યવિસ્તાર, તેમનું વહીવટીતંત્ર, તેમના સમયના આર્થિક, સામાજિક તથા સાંસ્કૃતિક જીવન વગેરે વિષે ઠીક પ્રકાશ પાડ્યો છે, પરંતુ નંદોને તેમના પુરોગામી (શિશુનામ વંશના રાજાઓ) તરફથી મળેલા વારસા તથા તેમણે તેમના અનુગામી (ઔર્ય રાજ્ય વંશ)ને આપેલા વારસાની ધણી ઓછી સમીક્ષા થઈ છે. ચંદ્રગુપ્ત મૌર્યની ચરતા અને કોટિલ્કની કુશાવ્રતા તથા મૌર્ય સમયના રાજકીય, આર્થિક તથા સાંસ્કૃતિક વિકાસની યોગ્ય રીતે પ્રશંસા કરવામાં આવી છે, પણ આ ઉત્કર્ષમાં નંદોના હિસાસાની નોંધ પૂરતી રીતે લેવાઈ નથી.

નંદોના હલકા કુળ સંબંધી વિવેચન

ઉપરોક્ત લગભગ બધાં જ સાધનો નંદોને હલકા કુળના મળે છે, પરંતુ અત્રે હલકા કુળનો અર્થ તેઓ શ્રદ્ધ જાતિના હતા તેવો લેવાનો છે. નંદ વંશના પ્રથમ રાજવી મહાપદ્ય કે મહાપદ્યપતિ^{૧૧} અથવા ઉમસેન^{૧૨} હતો. પુરાણોના કથન પ્રમાણે તે પુરોગામી રાજવંશના અંતિમ રાજાનો શ્રદ્ધ સ્ત્રીથી ઉત્પન્ન થયેલો (શ્રદ્ધા-મર્મ-ઉદ્ભવ) પુત્ર હતો. જૈન ગ્રંથ પરિશિષ્ટ પર્વણના નિર્દેશ મુજબ તે હજમ તથા ગણિકાનો પુત્ર (નાયિ-પુત્ર) હતો.^{૧૩} કટિંસના ઉલ્લેખ પ્રમાણે પ્રથમ નંદ રાજ પોતાની પહેલાંના રાજકુળના છેલ્લા શાસકના રાણીને

^૩ The Matsya, the Vāyu, the Vishnu etc.

Dynasties of the Kali Age (D.K.A.), pp. 24-25 (Pargiter),

^૪ Mahābodhivansh, Milindo-Panbo etc.

^૫ Āvashyak Sūtra, Parishishta Parvan

^૬ Curtius, Diodoros, Plutarch and others: *The Invasion of India by Alexander the Great*, McCrindle.

^૭ I.H.Q. XIV. p. 259.

^૮ Age of the Nandas and Mauryas.

^૯ Political History of Ancient India.

^{૧૦} The Age of Imperial Unity.

^{૧૧} Purānas.

^{૧૨} Mahābodhivansh.

^{૧૩} p. 46.

હજારથી વધેલો પુત્ર હતો.^{૧૪} બૌદ્ધ ગ્રંથોમાં પણ નંદોને અભ્યુદય કુળના (અશ્વત્થકુલ) કહેવા છે.^{૧૫} નંદોના શાસનકાળ આદ્ય ભારતે એક હજાર વર્ષ પછી અખાલેસા હર્ષચરિતમાં આથી આવડી પરંપરા પ્રમાણે આ બે હકીકતનું પુનરાવર્તન કરેલું છે. ભારતીય પ્રજાસિક્ષક પ્રમાણે પિતા હજાર કુળનો હોય તો બે કુળ હલકું મણિય એટલે હજાર અને રાણીના સંબંધથી ઉત્પન્ન થયેલા નંદ રાજાની ગ્રીક લેખકોની નોંધ વધારે અધ્યક્ષતા આવે છે. પુરાણો સિવાયનાં ભારતીય સાધનો પણ મોટે ભાગે થોડા ફેરફાર સાથે આ નિર્દેશને ટેકા આપે છે. પરંતુ આ વિધાનના અનુસંધાનમાં ખાસ વિચારવા જેવી હકીકત એ લાગે છે કે બૌદ્ધ ભગવાન તથા મહાવીર સ્વામીએ બ્રાહ્મણોના ધાર્મિક તથા સામાજિક અને ક્ષત્રિયોના રાજકીય આધિપત્ય સામે ઉઠાવેલા બળવાના પરિપાકરૂપે નંદ રાજ્ય સ્થાપ્યું હતું. ઈ.સ. પૂર્વે છઠ્ઠા તથા પાંચમા સદી સુધીમાં વૈદ્યો તથા શૂદ્રોને ધણાખરા રાજકીય, ધાર્મિક તથા સામાજિક હકોના ભોજવટામાંથી જાહેર રીતે બાકીત કરવામાં આવ્યા હતા. ખાસ કરીને બ્રાહ્મણો અને ક્ષત્રિયોનો શૂદ્રો પ્રત્યેના વર્તાવ યોગ્ય નહિ હોય તેમ અર્થશાસ્ત્ર, મનુસ્મૃતિ, જાતકકથાઓ, ગ્રીક લેખકો વગેરેના નિર્દેશો પરથી જાણવા મળે છે.^{૧૬} આ સંજોગોમાં બૌદ્ધ ભગવાને બધી જાતિઓની સમાનતાની ઘોષણા કરી. તેમના પ્રથમ મુખ્ય શિષ્યો પણ શૂદ્ર જાતિના હતા.^{૧૭} કોઈ પણ પ્રકારની આપણુદી સામે ઝડૂમવાની તેઓએ નીચલી જાતિઓને પ્રેરણા આપી. વળી ઈ.સ. પૂર્વે છઠ્ઠી તથા પાંચમી સદીનાં ભારતનાં ચાર મહા-રાજ્યો^{૧૮} અંદરોઅંદર લડીને નિર્જળ બન્યાં હતાં. માત્ર મગધ મહાસત્તા તરીકે ટક્યું; બાકીનાં રાજ્યોનું સ્વાતંત્ર્ય અસ્ત પામ્યું. રાજકીય વિખવાદની આ સ્થિતિમાં નીચલી જાતિઓ પણ બૌદ્ધ ભગવાનની પ્રેરણાથી રાજ્ય સ્થાપના ઉત્સાહિત થઈ હોય તે તક્ત સંભવિત છે. શિશુનામ વંશના ઉલ્લાસ રાજની કાલાશોક કે કાકવર્ણીની હત્યા કરીને મહાપદ્મ નંદવંશની સ્થાપના કરી તેવું મોટા ભાગનાં સાધનોનું કથન છે.^{૧૯} બાણ હર્ષચરિતમાં પણ આ પ્રકારનો ઉલ્લેખ કરે છે.^{૨૦} પુરાણો તેને સમસ્ત ક્ષત્રિય કુળનો ઉગ્રહૃદક (સર્વશર્નાતક) ગણે છે તે સ્પષ્ટ છે. બ્રાહ્મણ અને ક્ષત્રિય વર્ષસ્વથી કંટાળેલી આમજનતાનો તેને શરૂઆતમાં ટેકા મળતાં તેનો રાજ્યવિસ્તાર થયો હોય તે સંભવિત છે.

નંદ શાસકો

નંદ શાસકોનાં નામ, તેમના શાસનકાળનાં વર્ષો તથા તેમના ક્રમ વિષે ઇતિહાસવિદોમાં મતભેદ છે, તોપણ સામાન્ય અભિપ્રાય એવો છે કે કુલે નવ નંદ રાજાઓ થયા. મહેલની ખટખટ અને રાણીની કૃતધનતાના પરિણામે મહાપદ્મ નંદ શાસનની સ્થાપના કરી શક્યો.

¹⁴ McCrindle—Invasion of Alexander, p. 220.

¹⁵ Mahābodhivansh, Mahāvanshtikā

¹⁶ Manu Smṛuti IV-99

McCrindle : Megasthenes, p. 124-26.

¹⁷ Mrs. Rhys Davids : *Buddhist India*.

¹⁸ Magadh, Koshal, Kashi and Avanti (Mālawā)

¹⁹ McCrindle : *Invasion of Alexander*, pp. 221-22.

²⁰ Harsha-charita : Trans. by Cowell & Thomas.

તેણે પોતાના પુરોગામી રાજાની સાથે તેના યુગોનો પણ ખાત કરાવ્યો. ૨૧ લેની મુદ્દત દેશત (મહાપદ્મ) અથવા મહાન સૈન્ય(મહાપદ્મ)ને લીધે તે મહાપદ્મ કહેવાતો તેનું પુરાણોનું વિધાન અન્ય સાધનોના વિધાન સાથે સરખાવતાં અસત્ય કરતું નથી. ૨૨ તેણે ૮૮ વર્ષ સુધી શાસન કર્યાનો મત્સ્યપુરાણની એક પ્રતનો નિર્દેશ મૂલભરેલો લાગે છે. ૨૮ (અષ્ટાવિંશતિ)ને બદલે ૮૮ (અષ્ટાશતિ) લખાયું હોવાનો સંભવ છે. વાયુપુરાણ પણ મહાપદ્મ ૨૮ વર્ષ શાસન કર્યાનું નોંધે છે. મહાબોધિવંશ (૧) ઉગ્રસૈન્ય, (૨) પાંડુક, (૩) પાંડુમતિ, (૪) શૂતપથ, (૫) રાષ્ટ્રપાલ, (૬) ગોવિશાણુક, (૭) દશસિક્ક, (૮) કેવર્ત, અને (૯) ધનનંદ એમ નવ નંદ શાસકો મળ્યાવે છે. તે નવે નંદોને બાઈએ માને છે જ્યારે પુરાણો મહાપદ્મ પછીના આઠ શાસકોને તેના પુત્રો લેખે છે. પુરાણો ફક્ત મહાપદ્મ અને તેના મુત્ર સુમાત્મનું નામ આપે છે. સુકલ્ય, સાહલ્ય કે સહસિન (દિવ્ય-અવધાન) તે સુમાત્મનાં જ અન્ય નામો ૨૭ લાગે છે. જૈન ગ્રંથો પણ નવ નંદોનો નિર્દેશ કરે છે. ૨૪ આ ઉદ્દેશ્યો જોતાં 'નવ'નો અર્થ 'નવા' હોવાનું કેટલાક ઇતિહાસકારોનું મત્તવ્ય અસ્વીકાર્ય મળ્યાય. સુમાત્મ પછીના નંદ શાસકોનાં નામ શંકરપદ છે, તોપણ નંદ વંશનો અંતિમ રાજા સિકંદરના બાદેત પરના આક્રમણ સમયે મગધ પર રાજ્ય કરતો હતો તે નિશ્ચિત છે. પુરાણોમાં તેના નામનો નિર્દેશ નથી, પરંતુ ઓક ઇતિહાસકારોએ તેનું નામ આપેલું છે. કટિંસ તેનો 'અગ્રેમસ' તરીકે ઉલ્લેખ કરે છે. તે કદાચ સંસ્કૃત શબ્દ 'ઉગ્ર સૈન્ય'નું પરિવર્તિત રૂપ હોઈ શકે. હીઓડોરસ તેને 'શદ્રેમસ' કહે છે. બન્ને લેખકો તેની શાસનવ્યવસ્થા તથા સૈન્યશક્તિની પ્રશંસા કરે છે. બૌદ્ધ સાહિત્ય તેને ધનનંદ કહે છે. સિકંદરના સૈનિકોએ તેના વિસ્તૃત રાજ્ય અને વિશાળ સૈન્યની હકીકતો સાંભળીને પરાજિત થવાના બચથી સિકંદર પર સ્વદેશ પાછા ફરવાનું દયાણુ કર્યું હોય તે શક્યતા નકારી કાઢવા જેવી ન મળ્યાય. સિકંદરને મળ્યું પાછા ફરવાનું આ એક કારણ હોઈ શકે. અંદગુપ્ત મૌર્યે આણુક્ય અને અન્યની સહાયથી આ જ નંદ રાજાની હત્યા કરીને મૌર્ય રાજ્યવંશની સ્થાપના કરી હોવી એકાદ (ઈ. સ. પૂર્વે ૩૨૪).

નંદોનો રાજ્યવિસ્તાર

પુરાણો મહાપદ્મનું અનેક ક્ષત્રિય રાજ્યોનું ઉચ્છેદન કરનાર તરીકે વિવરણ કરે છે. આ કથનમાં થોડી અતિશયોક્તિ હોય તોપણ નિર્દેશિત સાધનોના જણાવ્યા પ્રમાણે તે સમયના ઉત્તર ભારતના ક્ષત્રિય રાજ્યવંશો — ઇક્ષ્વાકુ, ૨૭ કાશી, પાંચાલ, ૨૮ કુરુ, ૨૯

21 Same as No. 19.

22 Curtius, *Āvasyaka Sūtra*

23 *Dynasties of the Kali Age*, pp. 24-25 (Pargiter)

24 *Āvasyaka Sūtra : The Age of Imperial Unity*, p. 31.

25 McCrindle : *The Invasion of India*, p. 222.

26 Kautilya's *Arthashastra* *Milindā-Panho*, *Purānas*, *Plutarch & Justin* *Mudrārākshasa* etc.

27 Koshala (*Ayodhyā*).

અલ્પેભ, ૨૦ હેક્ટર, ૩૧ મેચિલા, ૩૨ કલિંગ, ૩૩ અશ્મક, ૩૪ વીતિહોત્રક વગેરેનો પ્રથમ નંદ રાજા મહાપદે પરબળ કર્યો હતો. ઉચ્છેદનનો અર્થ આ રાજ્યોને તાબે કર્યો હતો. અર્થવા તેમને ખેતરનું સર્વજીવન સ્વીકારવાની ફરજ પાડી હતી તેમ મણી શકાય. ઇલ્લકુ કે કોસલ અગત્યનું હાથે પરાજિત થયેલ. તેના વિખ્યાત રાજાઓ પ્રસન્નજિત તથા તેજ પુત્ર વિદુલના અંત ખાદ કોસલનો ઇતિહાસ અનિશ્ચિત હતો. મહાપદે તે પોતાના રાજ્યમાં સમગ્ર લીધું હતી. કથાસરિત્સાગર પણ કોસલમાં નંદ રાજાની અવધી હોવાનો ઉલ્લેખ કરે છે. ૩૫ ગ્રીક લેખકોના કથન પ્રમાણે પાંચાલ, કુરુ તથા સુરસેન પ્રદેશો નંદ રાજાને તાબે હતા. ૩૬ કાથી ભિન્નિસારના સમયથી જ મગધ સામ્રાજ્યનો જાગ હતું. પાછાંટરના નિવરણ પ્રમાણે હેલ્ય મગધપ્રદેશમાં આવેલું હતું અને તેની રાજધાની મહિષપતી હતી. માળવા અને ગુજરાત ભૈરવ સામ્રાજ્યના વિભાગો હતા તેમ આલિમેનિક અને સાહિત્યિક પુસ્તકો પરથી સિદ્ધ થાય છે. નંદો તરકથી આ પ્રદેશો ભૈરવેના વારસામાં મળ્યા હોવા તે તફન શક્ય છે. વિખ્યાત જનક રાજાની મૈથિલા નગરી નેપાલની સરહદ પર આવેલી હતી. વૈશાલી આ રાજ્યનું બીજું અગત્યનું શહેર હતું. ક્ષિત્ત્રી સત્તા નિર્ભળ બન્યા બાદ આ પ્રદેશ નંદોના પુરોગામીઓને તાબે આવ્યો હતો. નંદો પણ તેના પર આધિપત્ય બોગવતા હતા.

પ્રખ્યાત જૈન રાજાની ખારવેલના હાથીગ્રહાના શિલાલેખથી માલુમ પડે છે કે કલિંગ પ્રદેશમાં તેની પહેલાં આશરે ત્રણસો વર્ષે નંદ રાજાનું શાસન હતું. તેણે લોકહિલને માટે નહેરો ખોદાવી હતી તથા ખારવેલે નંદ રાજા વડે લઈ જવામાં આવેલી જૈન દેવની મૂર્તિનું ફરીથી કલિંગમાં સ્થાપન કર્યું હતું. ૩૮ અશ્મકનું રાજ્ય ગોદાવરીના તીરે દખ્ખણમાં હાલના નિકામા બાદની આસપાસ હતું. તેની રાજધાની પોટલી, પોટન કે પોદન હતી. ગોદાવરીને તીરે આજે પણ 'નવ નંદ દહેરા' (નાદેર) નામનું શહેર છે. નાદેરને નંદોનું રાજ્ય આ પ્રદેશમાં હતું તેની સાબિતીરૂપે મૂકી શકાય. વીતિ હોત્રાનું રાજ્ય પણ નર્મદા અને ગોદાવરી વચ્ચેના પ્રદેશમાં આવેલું હતું.

ભૈરવેના આધેસો વિશાળ રાજ્યનો વારસો

અલખત, દુઆમાંના મોટા ભાગના નિર્દેશો પછીથી લખાયેલા પ્રથેના છે એટલે તફન વિવેચસતીય કહેવાય નહિ, છતાંવે તેમને ગ્રીક લેખકોનાં લખાણો સાથે સરખાવતાં ધણીખરાં વિધાનો મળતાં આવે છે. પરિણામે ઉપરોક્ત હકીકતનો સ્વીકાર કરીએ તો નંદોનું રાજ્ય ઉત્તરે છેક નેપાલથી માંડીને દક્ષિણે ગોદાવરી નદી સુધી તથા પશ્ચિમે પંજાબની સરહદથી માંડીને પૂર્વે અંબાળ સુધી ફેલાયેલું હતું તેમ કહી શકાય. મૈસુરના ૧૨-૧૩મા સોદાના

28-29-30 Region between Ganga & Gomati — Central Doab.

31 Central Provinces.

32 Near Nepal.

33 Orissa.

34-35 Between Narmada & Godavari.

36 Tau-ney 13 Translation, p. 21.

37 *Alexander's Invasion*, pp. 221-222

38 I.H.Q. XIV, pp. 259-60 Hathigumpha Ins. of Khāravela

અમુક લેખોના ઉલ્લેખો પ્રમાણે કુતાલ (મુંબઈની દક્ષિણે) પર પણ નંદોનું આધિપત્ય હતું, ૩૯ પરંતુ વિદ્વાનો યોગ્ય પુરાવાને અભાવે આ હકીકત માન્ય રાખતા નથી. પશ્ચિમ પર્વતમાં પણ નંદોનું રાજ્ય વિશાળ હોવાનું વિધાન છે. ૪૦ ગ્રીક લેખકો સિંહરના સમયને પાલિભોથ (પાટલિપુત્ર)નો રાજા રાજપૂતાનાના રજુપ્રદેશથી માંડીને ગોન્ડેરીડે (ગંગા પ્રદેશ) તથા પ્રસી (પ્રાચ્ય-પૂર્વ) પ્રદેશ સુધીના વિશાળ મુલક પર રાજ્ય કરતા હોવાનું નોંધે છે. ૪૧ પ્લાઇનીઝનું પણ આ પ્રકારનું કથન છે. આ વિવરણ યોગ્ય માનીએ તો નંદોનું રાજ્ય વિસ્તારમાં ગુપ્ત સામ્રાજ્ય કરતાં થોડું મોટું અને મૌર્ય કરતાં થોડું નાનું ગણાય. આ રીતે મૌર્ય સામ્રાજ્યની વિશાળતા અને મહત્તાનો પાયો નંદોએ નાખ્યો કહેવાય. વર્ણી સિંહરનાં આગળનાં આક્રમણને અટકાવનાર તથા ભારતીય રાજ્યને મૌર્યેતિ માટે બચાવનાર પણ નંદોને જ ગણવા જોઈએ. પુરાણોએ પ્રથમ નંદ રાજાને માટે 'એક રાત' શબ્દ વાપર્યો છે તે ચક્રવર્તી માટેના સૂચક શબ્દ છે. પ્રથમ નંદ રાજાએ ૨૮ વર્ષ રાજ્ય કર્યું અને તેના બાદ તેના આઠ પુત્રોએ ૧૨ વર્ષ રાજ્ય કર્યું હોવાનું ધણાંખરાં સાધનો નોંધે છે. બૌદ્ધ ભગવાનનું નિર્વાણ ઈ. સ. પૂર્વે ૪૮૬ અને ચંદ્રગુપ્ત મૌર્યનો રાજ્યાભિષેક ઈ. સ. પૂર્વે ૩૨૪ માન્ય રાખીએ તો બિંબિસારથી માંડીને છેલ્લા નંદ રાજા ધનનંદના અંત સુધીના સમય લેતાં નંદ રાજ્યકાળ ઈ. સ. પૂર્વે ૩૬૪થી ઈ. સ. પૂર્વે ૩૨૪ સુધી ગણાય. ૪૨

નંદોની વહીવટી અને લશ્કરી વ્યવસ્થા

નંદોએ ફક્ત ચાળીશ વર્ષ જ શાસન કર્યું તે ઐતિહાસિક દૃષ્ટિએ જોતાં ટૂંકા ગાળો ગણાય, છતાંયે તેમણે વિશાળ રાજ્ય, બરપૂર તિજોરી તથા મોટું સૈન્ય પોતાના વારસદાર (મૌર્ય)ને આપ્યું તેમાં જ તેમની મહત્તા રહેલી છે. ક્ષત્રિયોના સૈકાઓથી ચાલ્યા આવતા રાજકીય આધિપત્યને ઢિન્નબિન્ન કરીને પ્રથમ સમય જ નીચલા વર્ગનું રાજ્ય સ્થાપનાર મહાપદ નંદ પ્રથમ ઐતિહાસિક રાજાની ગણી શકાય. ૪૩ તેણે વૈદિક સમયથી ભારતની લુપ્ત થયેલી રાજકીય એકતા પાછી આપીને એકચક્રી રાજ્યની સ્થાપના કરી. મૌર્ય, કુશાણ, ગુપ્ત વગેરે રાજ્યવંશોએ આ જ પરિપાટો પર ભારતની રાજકીય એકતાને વિશેષ દૃઢ કરવા પ્રયાસો કર્યા. એરિયના કથન પ્રમાણે ગંગાપ્રદેશના રાજા(નંદ)નું વહીવટીતંત્ર નમૂનેદાર હતું. જેતી અને વેપાર-ઉદ્યોગનો વિકાસ થયેલો હતો. સામંતો તથા સુબાઓને ૪૪ હસ્તક પ્રાંતિક વહીવટ હતો. જનપદ (પ્રાંત), વિષય (જિલ્લો), આહાર (તાલુકો) તથા ગ્રામ (ગામડું) વહીવટી એકમો હતા અને દરેક પર અનુક્રમે મોટે ભાગે મહામાત્ર, રાજજુક કે પ્રાદેશિક, રાષ્ટ્રીય તથા ગ્રામમુખની નિમણૂક થઈ હતી. ધણું કરીને આ જ પદ્ધતિ પર ચંદ્રગુપ્ત તથા અશોકે પોતાની

⁴⁰ Rice : Mysore and Coorg, p. 3.

Fleet : Dynasties of the Kanarese District, p. 284.

⁴¹ P.H.A.I. Raychaudhari, p. 234, 6th ed.

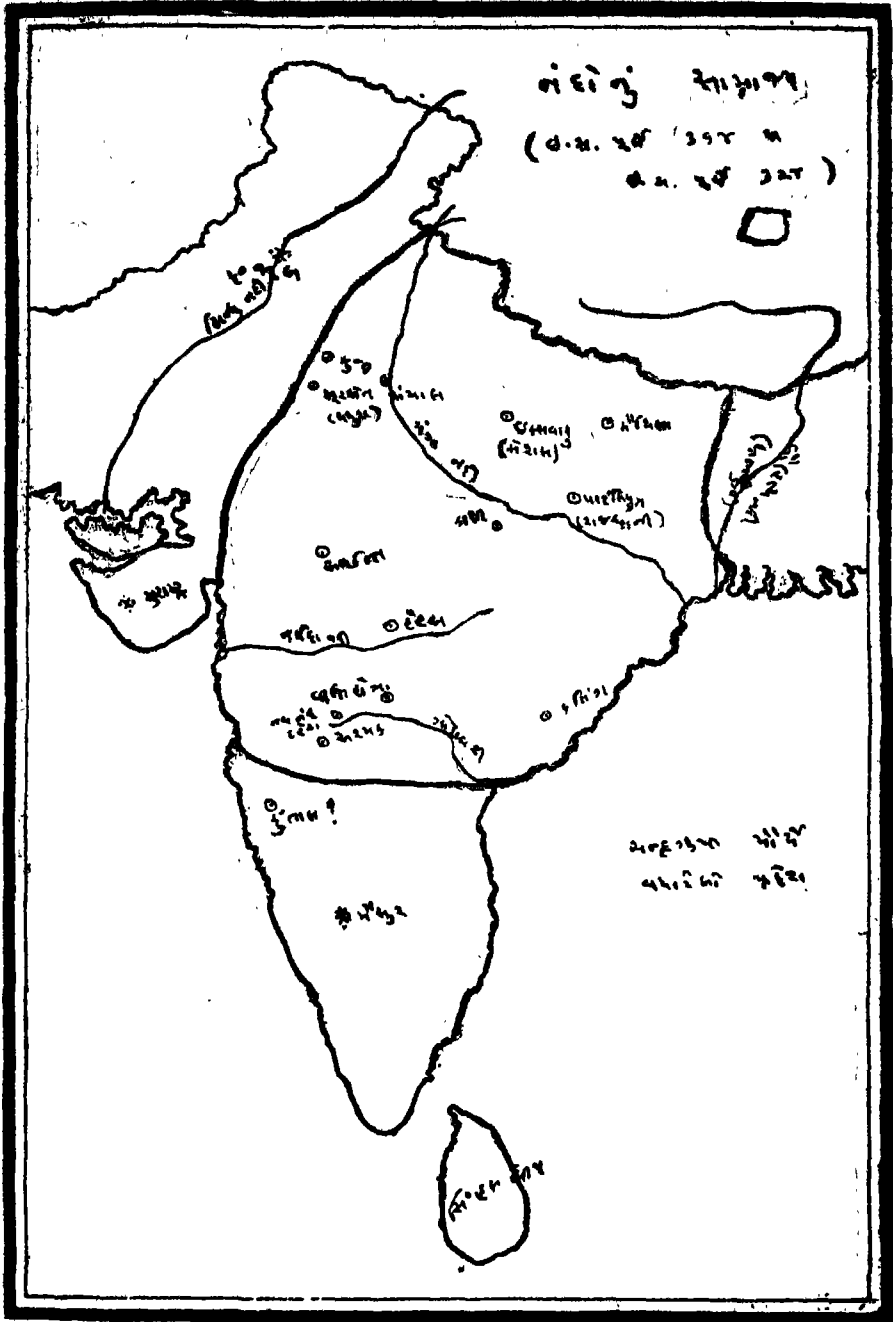
⁴² McCrindle : Magasthenes & Arrian, pp. 67, 141.

Invasion, p. 221, 281.

⁴³ The Age of Imperial Unity, p. 38.

⁴⁴ Age of the Nandas and Mauryas, Nilkatha Shastri pp. 21-22.

⁴⁵ Hyparch (akshatrap) mentioned by Greek writers.



શાસનવ્યવસ્થા વિકસાવી હતી. કટિંગના કથન પ્રમાણે નંદ રાજ પાસે ૨,૦૦,૦૦૦નું પામણ, ૨૦,૦૦૦નું અમણ, ૩,૦૦૦નું હસ્તીદળ તથા ૨,૦૦૦નું રથદળ હતું. ડીઓડોરસ મળદળનો આક્રોડ ૪,૦૦૦નો તથા પ્લુટાર્ક ૬,૦૦૦નો મૂકે છે. ૪૫ આ આક્રોડનો નંદોની નેધિપાત્ર લશ્કરી તાકાતનો ખ્યાલ આવે છે. સિકંદરે તથા તેના ચૈત્રિયોએ આ હકીકત જાણી હોવી જોઈએ. પરિણામે તેમને યુદ્ધનું આહ્વાન યોગ્ય ન લાગ્યું હોય તે સંભવિત છે. મેગેસ્થનીસ અંદરૂપત મૌર્યનું લશ્કર કુલે ૬,૦૦,૦૦૦નું હોવાનું જણાવે છે. ૪૬ તેના લશ્કરના વિભાગો — પામણ, હમણ, હસ્તીદળ તથા રથદળ — તથા તેનું લશ્કરી આયોજન નંદોની લશ્કરી વ્યવસ્થા પર રચાયેલું હતું તેમ મેગેસ્થનીસના વિવરણ પરથી જાણવા મળે છે. જૈન ગ્રંથ આવશ્યકસૂત્રના નિર્દેશ મુજબ મહાપદનો મુખ્ય પ્રધાન અને મુખ્ય લશ્કરી મંત્રી કલ્પક હતો. તે જૈન હતો. તેની સલાહ અનુસારના લશ્કરી આયોજનથી મહાપદે ક્ષત્રિયોને તાબે કરીને રાજ્યવિસ્તાર કર્યો હતો. આ ઉપરથી ફલિત થાય છે કે નંદોના સમયમાં વહીવટી તથા લશ્કરી વડાનું પદ એક જ વ્યક્તિહસ્તક હતું. મુખ્ય મંત્રીમાં સર્વોચ્ચ વહીવટી તથા લશ્કરી ગુણોની અપેક્ષા રાખવામાં આવતી હતી. છેલ્લા નંદ રાજ ધનનંદનો મુખ્ય વહીવટી તથા લશ્કરી મંત્રી ‘શકતાલ’ હતો. ૪૭ તે ‘કલ્પક’નો વંશજ હતો માટે આ પદ વંશપરંપરાગત હશે તેમ પણ અનુમાન થઈ શકે. ૪૮ ઉપરના વિવરણથી એ પણ સ્પષ્ટ થાય છે કે નંદોના સમયમાં બૌદ્ધ ધર્મની સાથે જૈન ધર્મનો પ્રભાવ પણ વધ્યો હશે.

નંદ શાસકોની ક્ષતિઓ

નંદ શાસકોની વહીવટી અને લશ્કરી વ્યવસ્થા એકંદર પ્રશંસાપાત્ર હોવા છતાંયે મોટા ભાગનાં સાધનોના જથ્થાવ્યા પ્રમાણે તેઓ લોભી અને વધુ પડતા ધનલાલસ્યુ હતા. છેલ્લા નંદ રાજનું ઉપનામ ધનનંદ હતું. તેણે અતિ કરવેરા અને દરબિયાત ઉધરાણાં દ્વારા પ્રજા પાસેથી પુષ્કળ ધન એકત્રિત કર્યું હતું. તેણે આમડાં, ગુંદર, ઝાડ, પથ્થર તથા અન્ય અનેક ચીજો પર વેરા નાખ્યા હતા. ૪૯ તેણે ૬ કરોડ અને ૬૦ લાખ સોનામહોરો એકત્રિત કર્યાનું કથાસરિત્સાગર નોંધે છે. બૌદ્ધ ગ્રંથો તેણે ૮૦ ટાટિ સોનામહોરો મંગા નદીના પ્રદેશમાં છુપાવી હોવાનું જણાવે છે. તેના અતિ ધનલોભને કારણે તે ધનનંદ (ધનનો પૂજારી) કહેવાતો. પુરાણો અને જૈન ગ્રંથો તથા ગ્રીક લેખકો અને જીનસંગ પણ આ જ પ્રકારની હકીકતો નિર્દેશ કરે છે. ૫૦ અંદરૂપત સિકંદરને મળ્યો ત્યારે તેણે સિકંદરને પણ આ હકીકત જણાવી હતી અને પુરુરવા (પંજાબનો રાજા પોરસ)એ તેની આ વાતનું સમર્થન કર્યાનું

⁴⁵ *The Invasion of India by Alexander*, p. 222.

⁴⁶ McCrindle : *Ancient India as Described by Megasthenes and Arrian*

⁴⁷ *Āśvayakasūtra* : pp. 435-36.

⁴⁸ *The Mauryas and the Guptas also had such hereditary posts. (The Classical Age, pp. 343-44.)*

⁴⁹ *Mahāvansh, The Kathāsarita Sāgar.*

⁵⁰ Same as Ref. No. 46 and Watters, V. II, p. 96.

મીઠા લેખકોને મળે છે. ધનનંદ અતિશય લેખકને લીધે પ્રભામાં અધુનાનીતો થયો. પત્રિકાને અંતરુપ્તને માટે તેને ઉચ્ચાવી પાડવાનું મુશ્કેલ બન્યું નહિ.^{૫૨}

નંદરાસનનું મુદ્દાકેન્દ્ર

જો કે નંદરાસન ફક્ત ચાળીસ વર્ષ ૪૮૬૫ અને તેના પછી તેના પુરાગ્રામી (સિમુનામ)ની મારફત કુલુખ અંત આવ્યો, જ્યાં સેકાઓથી આવ્યું આવતું આદિજોનું સામાજિક તથા કુલિયોનું સંજ્ઞાત આધિક્ય અથમ સમય નાબૂદ કરવાનું માન તેમને ફાળે ગયું છે. બૌદ્ધ તથા જૈન ધર્મે પ્રચલિત રહે માન્યતાઓને આપેલા આધાતને તેઓએ વધારે દૃઢ બનાવ્યા. તેઓએ વૈદ્ય અને શકોનું રાજ્ય સ્થાપવાની પ્રયત્નલિલા પાટી; બિંપિસાર રાજ્યવંશી મગધની મહત્વા સ્થાપિત કરી. તે મહત્વાને વિકસાવનાર નંદો હતો. મગધ અને પાટલિપુત્રના નંદોએ સ્થાપેલો પ્રભાવ સમગ્ર નવરસ વર્ષ (પાંચમા સૈકાને અંતે ગ્રુપ સામ્રાજ્યના અસ્ત સુધી) ખર્ચે ટકી રહ્યો.^{૫૩} નંદોના આધિક્ય નીચે મગધ અને પાટલિપુત્ર નવી રાજ્યવ્યવસ્થા (નીમ્નલા વર્ષ) તથા નવી સંસ્કૃતિ (બૌદ્ધ અને જૈન)નું મહાધમ બન્યાં. તેમના શાસનકાળમાં બૌદ્ધ તથા જૈન ધર્મને સારો જોડો વેગ મળ્યો. ચંદ્રગુપ્ત મૌર્યે જૈન ધર્મને તથા અશોકે બૌદ્ધ ધર્મને આપેલ ખાસ પ્રેરણાકનું મૂળ નંદ રાજ્યોની આ ધર્મને ઉત્તેજન આપવાની નીતિમાં રહેલું થયું. પરમખાદાણુ વિષ્ણુગુપ્ત(આણુક)નો નંદો સામેનો કાપ મુખ્યત્વે કરીને નંદોએ વૈદિક ધર્મને આધાત આપવામાં બળવેલા ખાસ ભાગને પરિણામે હતો તેમ કહી શકાય. પુરાણો પછી આ ૪ કારણે નંદ રાજ્યોનો તિરસ્કારપૂર્વક નિર્દેશ કરે છે. મમે તે હોય પરંતુ નંદ શાસનકાળ દરમિયાન દૃઢ થઈ ગયેલી શાસન, સમાજ અને ધાર્મિક વ્યવસ્થાને એક મોટો ધક્કો લાગ્યો. એ રીતે એક મુગ પૂરો થયો અને નંદોએ બીજા મુગની સંખ્યાત કરી, જેમનું નેતૃત્વ લેવાનો યશ નંદોએ મૌર્યોને આપ્યો.

⁵¹ The Age of Imperial Unity, pp. 59-60.

⁵² P.H.A.I. 6th ed., pp. 234-35.

SUMMARY

So-called Dark Ages of Ancient Indian History—I

R. K. DHARAIYA, Department of History

School of Social Sciences, Gujarat University

Importance of Dark Ages I

The term 'dark age' defined—Most of the Pre-Maurya periods may be marked as dark ages—Ages of Nandas, Sātāvāhanas, Nāga—Bhārshivas and of some others may be called dark ages—Reasons and proofs—their great significance in history—proper analysis and synthesis of the material essential.

Source, material of the History of the Nandas :

Puranas-Baudha literature-Jain literature-writings of Curtius, Arthashastra of Kautilya-inscription at Udayagiri of Khārvel-references of Bāna and of Hiuen Tsang-drama Mudrārākshasa-writings and books of modern authors.

Low origin of the Nandas

Meaning of the word 'low origin'-references in different sources-Political impact of the preachings of Baudha and Mahāvīr Swāmi-Predominance of Brāhmanas and Kshatriyas disliked by common people.

The Nanda Rulers

No definite account of names, the duration of their reign, the main events during their rule etc.-the interpretation of figure 'nine'-different authorities quoted.

Expansion of the Empire

Territories of the Nanda empire named in Puranas and in other sources-but their exact location is a subject of controversy-Meanings of the terms-Ikshvāku, Haihayas, Ashmak, Surasena, Vittihotra etc. also doubtful.

Administration

Enough details not available-but well organised state with powerful military force-administrative units-fiscal system etc. described by contemporary writers.

Later Nandas-End of the dynasty

Weak-miserly-intolerant-unpopular-references of the overthrow of the dynasty by Greek as well as Indian sources-Results.

APPLICATION BLANK AS A TOOL OF PERSONNEL MANAGEMENT

MISS JAYSHREE DESAI

*University School of Social Sciences
Gujarat University, Ahmedabad-9*

Personnel Management means management of those functions which relate to the personal or internal aspect of the organisation. Personnel Division or a department in any organisation is concerned with the important functions of selection, placement, transfer, promotion, demotion and discharge of an employee. Selection is the primary phase and an important feature of the personnel department. Different ways and means are employed for a selection procedure. The first step of any selection procedure is construction and use of an application blank.

Application Blanks are useful for getting basic general information regarding the employees. An interview call and the content of selection procedures largely depend upon the material available from the application blank. Thus, it is an asset to both the employers and the employees. An employer's inquiry regarding an employee's suitability for a job concerned can be made available through a properly devised application blank. In the same way, an employee can express himself clearly by replying to different questions of the application blank.

Application Blanks are of two types. The preliminary application blank and the regular employment application blank. The preliminary application blank contains certain basic information regarding the applicant on the basis of which an applicant

¹ The term 'Application Blank' is a technical term used for application form by W. D. Scott, R. C. Clothier and W. R. Spiegel in their book *Personnel Management* (McGraw-Hill Book Company, Inc., New York 1954), p. 107.

Application Blank as a Tool of Personnel Management

is advised whether he should fill up the regular employment application blank or not. The regular employment application blank contains detailed information regarding the employees.

It is a major tool of an Interview also. As Morris Viteles states, "The application blank, generally filled in by the candidate for employment prior to the interview, represents another traditional aid in selections."² Construction of an employment application blank demands vigilance and analytical observation. Before constructing an employment application blank, the job concerned should be analysed. Major contents of the job in terms of duties and functions should be listed. Each item should be numbered with its relative importance for the occupation. In the light of the above analysis, the qualities and qualifications required from a person for the performance of a task should be listed. The major interest of an individual and his total experience of work can be also counted on the basis of the past experience of the company. Thus the construction of an application blank requires analysis of the work and that of the worker. In the words of Shri M. J. Jucius it can be stated that, "In determining what information is to be asked for on an application blank, it is invariably necessary to reach a compromise between what is wanted and needful and what can be obtained effectively on such a form. Applicants are not always willing to give answers to such questions as financial status or details of personal history. Moreover, detailed application blanks may drive applicants away, particularly during conditions of a tight labour supply."³

The type of application blanks differ from company to company, depending upon the nature and policy of the company but in majority of the cases, name, address, educational qualification, physical fitness, experience, special abilities and interest together with the names and addresses of references are given primary importance. It can be illustrated from the adjoining two applications.

² Morris S. Viteles : *Industrial Psychology* (U.S.A. 1955), p. 179.

³ Michael J. Jucius, *Personnel Management* (Home Wood, Illinois, 1955), p. 146.

Illustrative Application Blanks are given below :*

APPLICATION REFERENCE NO. 1

PHILIPS INDIA LIMITED

Paste
signed photograph of
recent origin

$$2\frac{3}{4} \times 2'$$

Passport-size

Application for Employment

1. Please answer all questions carefully and completely in your own handwriting. Check (✓) where necessary.

Position for which applying.

PERSONAL DATA

1. Name _____
(Block Letters) (Surname) (First Name)
2. Present Address _____
3. Permanent Address _____
4. Date of Birth _____ Place of Birth _____
5. Single ☐ Married ☐ Widowed ☐ Engaged to marry ☐
No. Age :
6. No. of children : Boys _____ Other
Girls _____ Dependants _____
7. Do you live in joint family? Yes ☐ No ☐
8. How many earning members including yourself _____
9. How many brothers do you have _____ sisters _____
10. Father's/Husband's Name _____
11. Father's/Husband's Profession _____
If guardian, Name _____
Profession _____

* The specimen given above is from Philips India Limited.

II	12. Height _____	13. Weight _____																																								
	14. General condition of health } Excellent <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Indifferent <input type="checkbox"/>																																									
	15. Have you any : physical handicaps } * Sight <input type="checkbox"/> Hearing <input type="checkbox"/> Speech <input type="checkbox"/> Feet <input type="checkbox"/> Hands <input type="checkbox"/>																																									
	16. Have you had any major operation within the past year : Yes <input type="checkbox"/> No <input type="checkbox"/>																																									
III	17. Have you had illness in the past three years where you lost more than 15 days : Yes _____ No _____ If yes, please specify _____																																									
	18. List in order of highest degree first and second degree next and so on.																																									
III	<table border="1"> <thead> <tr> <th>Institution and University Location</th> <th>Period attended From To</th> <th>Subjects taken</th> <th>Degree/ Diploma received and Class/Rank</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>		Institution and University Location	Period attended From To	Subjects taken	Degree/ Diploma received and Class/Rank																																				
	Institution and University Location	Period attended From To	Subjects taken	Degree/ Diploma received and Class/Rank																																						
19. Any special subjects or training undertaken : _____																																										
20. Particulars of scholarship or special merit : _____																																										
21. What extra curriculum school/college activities did you participate in, if any : _____																																										
22. What offices or positions did you hold in such activities ? _____																																										
23. Were these elected or nominated positions ? _____ Elected <input type="checkbox"/> Nominated <input type="checkbox"/>																																										
24. Have you served apprenticeship ? If so, give details : Name of Establishment Date Nature of trade Duration _____ _____ _____																																										

IV

EMPLOYMENT RECORD

25. List present or most recent employer first, previous employer next, etc.

From Mo.Yr.	To Mo.Yr.	Employer, address and nature of business	Salary	Your position and nature of duties	Reason for leaving
----------------	--------------	--	--------	--	--------------------------

Which position did you consider most interesting? _____
Why? _____

26.	Languages	Speak	Read	Write
-----	-----------	-------	------	-------

1.
2.
3.
4.

MISCELLANEOUS

27. Where did you spend the greater part of your life up to 16 years of age: Village ☐ City under 5,000 ☐
City between 5,000 & 50,000 ☐ City over 50,000 ☐
Name of the City & State _____

28. How long have you lived at present address _____

29. Do you regularly read any of the following types of magazines? News ☐ Fiction ☐ Trade or Technical ☐
others _____

Give details: _____

30. What subject in the College interested you most? _____
Why? _____

31. Have you any relations in the service of this concern?
Yes ☐ No ☐

If so, specify :

1. _____
Name Designation and where

2. _____
Name Designation and where

MISCELLANEOUS

32. Please state below your reasons for wanting to join this company and taking up this job.

33. How much notice period do you require to appear for interview? _____

34. What salary, all inclusive, do you expect? _____

35. What places have you visited in the past two years? _____

36. Have you been abroad? Yes ☐ No ☐
If yes, please give details: _____

37. Reason for visit: _____

38. When can you start work if selected?

VI Please give names of two persons who know you intimately but are not relatives

1. Name :
Address :

2. Name :
Address :

Do you mind if the company make references to your references or previous employers directly?

Yes ☐ No ☐

No reference will be made without previous consent of the applicant.

I hereby certify that all the foregoing information is true

Date _____ Signature _____

Applicant.

Not to be filled by applicant

Interview Notes :

Test Data :

	Test	Raw Score	Percentile
1.			
2.			

3.

4.

5.

Action taken :

If employed :

Department _____ Classification _____

Starting date _____ Starting Salary _____

Signature**APPLICATION REFERENCE NO. 2*****Burmah Shell Refineries Limited****Application for Labour Employment****(1) Personal details**Name _____
(First Name) (Father's Name) (Surname)Present address (to which correspondence should be
addressed) _____

_____ Phone No. _____

Permanent/Home Town Address _____

Date of Birth _____

(Day) (Month) (Year)

Age-Next Birthday _____ Nationality _____

Religion _____ Caste _____ Height _____

Weight _____ Do you wear Glasses? _____ If so,

For reading only or always _____

Employees' State Insurance Scheme Number (If Insured) _____

Set _____

Employees' Provident Fund Scheme Account Number
(If a Member) _____

*The specimen given above is from Burmah-Shell Refineries Limited.

(2) Educational Qualifications (Please attach copies of certificates)

<i>Year</i>	<i>School/College/ University</i>	<i>Subject studied</i>	<i>Examination passed</i>	<i>Class obtained at the Examination</i>

(3) Employment and past experience

(Please also mention Military
Service, Apprentice Training
Course, etc., if any.)

(Up to present date)
(Please attach copies
of Testimonials)

<i>Date From To</i>	<i>Employer's Name & Address</i>	<i>Post held Type of work</i>	<i>Pay Basic Allowances</i>

May enquiries be made from your present employer ? _____

If you are not at present employed, what were your reasons
for leaving your last post _____

Were you ever employed / interviewed by us ? If so, give details

(4) Type of work

What type of work do you want ? _____

If this is not available, for

what other work would

you like to be considered _____

Are you willing and able to work shift ? _____

(5) Miscellaneous Information

Are you a member of Home Guards, Territorial Army, Auxiliary
Air Force, or any other similar organisations ? If so, give details
like date of joining, etc. _____

Sports and Hobbies _____

Any supplementary details you may wish to add _____

(6) Family Details

Are you married or single? _____ Number and Ages of children _____

Father's Name & Occupation _____

Have you any one _____ If so, who and
Dependent on you? _____ to what extent?

Have you any relative in this or any other oil company? If so, please give the following details.

Name of Oil Company	Name of Relation	Relationship	Position held
---------------------	------------------	--------------	---------------

Burmah Shell Refineries Ltd.			
------------------------------	--	--	--

(7) Languages

Mother-tongue	Other languages : Spoken	Written
---------------	--------------------------	---------

(8) References

If possible, please give the names and addresses of :

(a) *Persons under whom you may have worked regarding your technical ability and experience :*

(b) Responsible persons not related to you with regard to your character :

(9) Criminal Prosecution

Have you ever been prosecuted _____
in a Criminal Court? If so, give details and the result of the prosecution/s.

(10) Notice

If offered employment how soon could you start work? _____

(11) Declaration and Signature :

I, _____, do hereby declare that the foregoing statements and answers on this Application form have been given by me after fully understanding the questions and the same are true, full and complete in every particular and that I have not withheld any information; also I do hereby agree and declare that if the company offers me employment, these statements and answers and this declaration shall be the basis of the contract of employment between me and the Burmah-Shell Refineries Ltd. and that if any of these statements or answers are found to be untrue and/or incomplete or if any information is found to have been withheld by me, I hereby accept the Company's right to terminate my services.

Date : _____

Applicant's Signature

Where the form is filled in by a person other than the Applicant, that person should sign the following declaration :

I, _____, of (Address) _____
_____ do hereby declare that I have fully explained the above questions to the applicant and that I have truthfully recorded the answers given by him.

Date : _____

*Signature of the person filling
in the form*

I hereby declare that I am not connected, either as a partner or a relation, with any of the Directors of the B. S. R. Ltd. whose names and particulars as to address, etc., have been read by me/have been made known to me at the time of filling in this application form.

It can be seen from the adjoining application forms that for a new employee application blank provides him an opportunity of introducing himself to the company. Normally, an applicant tries his level best to fill up the application blank in such a way that all his better qualities might come up. Here

also clarity of thought and expression might be a great asset. The words and phrases used by the applicant should convey clear cut sense. In certain cases the application blank itself is responsible for the interview call or the rejection. As Indian Institute of Personnel Management states, "..... where many casual applicants apply, this form can be handed to them for completion so that only those with requisite qualifications and experience need be called for interview....."⁴

Next important function of an application blank comes in the Interview. As Scott, Clothier and Spriegel say, "..... This more refined information can be brought forth only in the carefully conducted interview. The application blank, consequently, merely furnishes the means of starting the process of securing the needed information about the applicant."⁵ An interviewer tries to get detailed information about the items filled in the application blank. He also checks the data contained in the application blank during the course of the interview. He might ask clarifications for certain items. For an employee, the interview can be easier if the application blank is properly filled out as he has to face the interview on the basis of information supplied by him. Thus an employee's success or failure in an interview depends upon the application blank to some extent. The information given by the applicant will not necessarily be accurate. It is a common experience that some aspects of home back-ground, educational and occupational history, and other past experiences are forgotten or distorted with the passage of time.

To conclude with it can be said that important consideration of an application blank comes up at the time of its interpretation, even though, similar words contain similar meaning it is a question of individual differences. Two individuals might convey different meaning, even though, they have used identical terms. A person interpreting the application blank

⁴ Indian Institute of Personnel Management. *Personnel Management in India* (Asia Publishing House, Bombay, 1961), p. 201.

⁵ W. D. Scott, Robert C. Clothier and Willam R. Spriegel *Personnel Management* (McGraw-Hill Book Company, Inc. New York 1954), p. 99-100.

should be well versed in study of psychology and human behaviour. He should have sufficient experience of the job or of similar capacity, since the application blank is a connecting link between the prospective employees and the company, a continuous evaluation of the application blank, on the basis of selected employees and their performance on the job can be fruitful. As companys differ in their approach and use of application blank, a research in the field of uses and construction of an application blank might provide a common data for similar business concerns.

INSTITUTION OF MARRIAGE

(As depicted in the *Paumacariyam* and contemporary sources)

DR. K. R. CHANDRA

L. D. Institute of Indology, Ahmedabad-9

The *Paumacariyam*¹ is a versified Prakrit Jain epic which deals with the life of Dās'arathi Rāma. It was composed by Vimalasūri in the c. 5th century A.D. It contains sufficient data bearing on various customs of marriage. Here we give a systematic account of the same corroborating it, wherever possible, with other literary references and contemporary evidences.

The *Paumacariyam* reveals that marriage was an important event in the life of a person. With it commenced 'gārhas-thya' life which was the foundation of family life. Therefore, necessary consultations as regards the 'kula', 'carita', 'vaya', and 'rūpa' i.e. family, conduct, age and physique were made before contracting any marital alliance, but rigidity in the field of inter-caste and inter-racial marriages was not observed.

Guardian's Responsibility: The act of marriage is often denoted in the *PCV* by the word 'pāṇiggahaṇa' (7.75; 24.33; 98.56). It was a symbol of 'svakaraṇa'² which entailed transfer of the authority of parents over the girl to the husband and for that the offering of the bride to a bridegroom is indicated by the word 'dinnā' (15.38). Thus the responsibility of marriage lay with the guardians. According to the *PCV*, king Mahendra was worried about the marriage of his daughter Añjanāsundarī (15.36). Vānarapati Sugriva was in anxiety for obtaining a suitable candidate for his daughter Padmarāga (19.37. See also 51.18; 36.11). In the above cases initiative is taken by the fathers of the girls and they get success in negotiations. Sometimes the father of a boy also took

initiative. For example, Vidyādhara king Puṣpottara demanded for his son the hand of the sister of Vānara Śrīkaṇṭha (6·6). In the absence of father the eldest brother became naturally the guardian of his younger ones (6·6; 9·28, 50). In the case of Lavaṇa and Aṅkuṣa, two sons of Sītā, their adopted maternal uncle, king Vajrajaṅgha arranged their marriage (98·1). Sometimes a male suitor himself made demand for the bride from her guardian (10·4-8). Thus the *PCV* reveals that generally the guardians themselves settled the marriage of their sons and daughters. In the contest type of marriage (*svayamvara*) it was the father of the bride who decided about the nature of the feat and in the selection type too it wholly depended upon the wish of the father of the bride to invite or not to invite a particular candidate. Further accompanying of the parents with the promising candidates in a *svayamvara* indicates that the consent and the wishes of the parents prevailed. Kaikeyī's initiative and then Daśaratha's consent to the marriage of their son Bharata with Subhadrā, the daughter of Janaka's brother, namely, Kanaka shows that generally father and mother both worked unitedly. One thing is to be noted that in these marriages there is hardly any instance of breakdown of marital relationship.

Wishes of Candidates: It is true that the parents settled their children's marriage but the wishes of candidates were not altogether neglected. King Mahidhara after losing all hopes for Lakṣmaṇa who was greatly cherished by his daughter, betrothed her to some other prince. Still after passage of some time when Lakṣmaṇa, per chance happened to go there, Mahidhara gave his consent very gladly to his daughter to make wedlock with him (36·9-40). Vidyādhara Candragati did his best to secure Sītā for his son Bhāmaṇḍala who was quite unable to live without her, though in vain (29·9-75). Sugriva married his daughter Padmarāga to Hanumat, the person of her own choice (19·40). It was on the request of Vidyādhari Padmā that her father withdrew from attacking king Śrīkaṇṭha and thus enabled her to form marital union with the latter (6·24-26). On the contrary side there is

on record one instance only when King Acala forcibly married his son to many girls and that too was done to prevent him from renouncing the world (82.69).

Due Consultations: Guardians of the brides held due consultations and after having considered various factors, they selected bridegrooms. King Mahendra took advice of his ministers and on the ground of merits he rejected others and selected Pavanañjaya for his daughter, Añjanā (15.14-27). Similarly Maya (8.3) and Rāvaṇa (12.1) counselled with their ministers before settling their daughters' marriage. Whenever the father was unable to decide for himself, he sought help from others. Thus when Tārā was simultaneously demanded by Vidyādhara prince Sāhasagati and Sugrīva, her father took advice of a monk. He predicted short span of life of Sāhasagati. Then the choice fell to Sugrīva (10.4-8).

Considerations in Marriage-Alliance: The status of family, conduct, good-looking features and parity in age were the main considerations for contracting marriage-alliances. King Piṭhu was not willing to offer his daughter to Aṅkuśa, because the former was quite ignorant of the antecedents of the family of the latter (ṇa ya ṇajjai kulavaṁso; 98.8). It was on account of the noble family and noble qualities (sundarakula-sambhūo-ḡuṇehi dūraṁ samuvvaha; 8.6) of Rāvaṇa that Maya married his daughter, Mandodarī to him. King Puṣpottara was requested by the envoy of Kirtidhavalā to marry his daughter to Śrīkaṇṭha because Śrīkaṇṭha belonged to 'uttamakula' and possessed 'uttamacarita' (6.17) as well as 'uttamarūpa' (6.18). Rāvaṇa married his daughter to such a person who belonged to a noble family 'visuddhakulavaṁsa' (12.2), who was dear to people (viṇayagunadhara logassa ya vallaḡo; 12.4) and possessed decorum as well as good qualities (lakkhaṇovaveo 12.3). Minister Sumati had advised Mahendra to marry Añjanā to Vidyutprabha because he possessed both 'guṇa' and 'rūpa' (15.21). Vajrajaṅgha was in search of such a bride for Aṅkuśa that she could stand equal to Aṅkuśa in 'rūpa' (rūveṇa aṇusaricchaṁ 98.3). Pavanañjaya was preferred to others as a

bridegroom for Añjanā because he surpassed even the Cupid in beauty and health (rūveṇa jovvaṇeṇa kāmassa sirim viḍambei 15.27). Therefore, it is said in the PCV that both the parties should have parity in status, character and physique.³ Among the ruling classes chivalrous qualities, power and other attainments were also considered in selecting a bridegroom (jovvaṇabalavīriyasattisaṃpanṇo 12.3, vijjāsahassadhārī atuliyabalavikkamo 8.6). The contest type of 'svayamvara' marriages indicate that bold and gallant bridegrooms had their success. Further the PCV reveals that the guardians did not select such candidates who were likely to die (10.7) or renounce the world at an early age (15.24). There are instances of suitors who were rejected on account of their being quarrelsome, hostile and polygamous (15.12-18).

It is corroborated by *Jataka* No. 200, that candidates having noble birth, sound character, good health and due reverence for elders were considered to be suitable bridegrooms.

Parity in Age: Parity in age was also an important factor. Therefore, the terms like "doṇṇi vi vayasāṇurūvasohāim eyāṇa samāga 6.21" and 'aṇusarisa jovvaṇāṇaṃ saṃjoo 15.22' have been used. No specific age of marriage is mentioned, but the terms like 'jovvaṇa 90.3', 'ṇavajovvaṇujjātāo 77.53', 'ṇavajovvaṇa saṃpannā 8.2', 'ṇavajovvaṇa ciñcaiyā 15.13', 'jovvaṇāpuṇṇā 12.1', 'laliyajovvaṇāpuṇṇā 8.160', 'udārakilaṇajogā 98.2', and 'raigūpasāravahantio 77.53' denote that marriage was performed when the candidates had attained full youth, adolescence and capacity to understand well the various aspects of love. Sītā was betrothed to Rāma when he had already completed his education and had also defeated the Mlecchas in a battle (27.41). Lavaṇa was married after having completed his education (98.2). Añkusa had already fought a battle when his marriage took place (98.56). Rāvaṇa married Mandodārī after having acquired many supernatural powers which must have entailed a severe penance on his part (7.130; 8.21), and to endure that hardship he must have been a grown young man. Hanu completed his student career, helped Rāvaṇa

in defeating Varuṇa and thereafter he got married (18·56; 19·32; 34·40). Vanika Dhanadatta was betrothed to Guṇamati but the latter's mother secretly rebetrothed her to Ś'rikānta. At this breach of contract Dhanadatta's younger brother became furious and killed Ś'rikānta (103·15). This incident shows that when Dhanadatta's younger brother was able to kill a man, Dhanadatta must have been an adolescent. Kaikeyī had completed her education and she had exhibited valorous traits while helping her husband in overpowering the disgruntled candidates before her marriage took place (24·9ff). All these instances of the people of different races and belonging to different strata prove that marriage was performed when the candidates were quite mature in age and were able to shoulder the responsibilities of household. However, the marriage of Lakṣmaṇa with Manoramā was solemnised when a long time had passed after his return from Lāṅkā (ch. 90). It shows that in cases of rulers, the parity of age was not observed always. It is interesting to note that the PCV does not refer to any child-marriage.

Other Factors : Prophecies and political motives also played an important part in bringing about marital-alliances. Rāma's marriage with the daughters of Gandharva (51·15-17), Lakṣmaṇa's with Viśalyā (64·18) and Cakravartin Hariṣeṇa's with Madanavālī were performed in accordance with the prophecies.

It was on account of political considerations that the defeated kings married their daughters to the conquerors. Thus king Siṃhodara of Ujjenī married his daughters to Lakṣmaṇa (33·139). Vijayaratha, the son of king Ativīrya married his sisters, Ratimālā and Vijayasundarī to Lakṣmaṇa and Bharata respectively (38·1, 7). There are similar cases of the Vidyādhara, Vānaras and the Rākṣasas. Defeated Vidyādhara king Samudra married his four daughters to Lakṣmaṇa (54·42), Discomfited (Kṣatriya king), Maruta married his daughter to Rāvaṇa (11·100). Vidyādhara king Indra was advised by his father to marry his daughter to Rāvaṇa for the same political reason (12·78). Routed king Varuṇa married his daughter to Hanumat (19·32). King Vajrakarṇa of Daśapura offered his daughters to Lakṣmaṇa.

because he was rescued by Lakṣmaṇa from the tyranny of king Siṃhodara (33·138).

Site and Time of Marriage-ceremony : Generally marriages were solemnised at the residences of the brides. It did not matter whether one hailed from the Aryan (Kṣatriya 28·130; 21·44; 24·33), Vānara (6·217; 19·40) or the Rākṣasa family (8·56, 62; 12·8). Among the Rākṣasas marriages were performed at the residences of the bridegrooms also (8·9; 7·75)⁴. Sometimes the marriage was performed at quite a different place. The marriage of Añjanā and Pavanañjaya took place on the banks of the Mānasa lake (15·40). Rāma and Lakṣmaṇa during their exile married various girls at Lankā though they belonged to different places (77·51). The *PCV* reveals that marriages were performed during auspicious hours (nakkhatte sohaṇe 6·27; suṇakkhatta-karaṇalaggammi 15·95).

Other Jaina literary sources corroborate the fact that sometimes marriages were solemnised at the residences of bridegrooms also. Poṭṭilā's marriage with Teyaliputta (*Nāyādharmakāhā* 14, p.149) and that of Mahābala with eight princesses⁵ are such examples.

Types of Marriages : It has been already stated that parents contracted the marriages of their children. Whenever the father offered his daughter to a suitable candidate, it fell under the 'prājāpatya' type of marriage. The betrothal of Sītā with Rāma (27·41), the marriage of Añjanā with Pavanañjaya (15·38), that of Mandodarī with Rāvaṇa (8·18) and Kekasī's with Ratnās'rava (7·72) fall under this group. Marriage alliances made on political considerations can also be put under this head. This type of marriage was widely prevalent in those days.

There were cases when parents were not consulted and on account of mutual love, the concerned candidates formed their own wedlocks. This type of marriage is termed as Gāndharva.⁶ The wedlocks of Rāvaṇa and many Vidyādhara girls (8·38), Vānara Hanu and Rākṣasī Laṅkāśundarī (52·2) and Vidyādhara S'rikanṭha and Padmā (6·9) are the instances among the

non-Aryans. This form of marriage was prevalent among the Aryans also. The union of (Brahmin) Airakucchi with the daughter of his teacher (25·22) and that of Purohita Piṅgala with the princess of Cakrapura (26·8) come under this type. Rāma and Lakṣmaṇa also performed love marriages.⁷ Lakṣmaṇa formed love wedlocks with princesses Kalyāṇamālā (34·3; 77·48) and Vanamālā (ch. 36). Padmarāga, out of many portraits, selected that of Hanumat. Her father Sugriva invited Hanu and married her to him (19·40). This is also Gāndharvavivāha according to the definition—"the father of the girl without consulting his own wishes gives away his daughter to a person whom the daughter likes and who reciprocates her sentiments" given in the Mahābhārata.⁸ Vanamālā and Kalyāṇamālā were married by their fathers in accordance with their wishes, hence their marriages can be assigned to this class.

There were occasions when girls were forcibly carried away and married. This type of marriage is termed as Rākṣasa-vivāha. Rāvaṇa married many girls seizing them by force (akṣamiya vikkameṇaṃ 9·51). His sister was kidnapped and married by Kharadūṣaṇa (9·12). This type of marriage was largely prevalent among the Rākṣasas. The Aryans are also found to be following this practice. Brahmin Śrīvardhita kidnapped a princess (77·85) and made her his wife. The Kṣatriyas are seen demanding girls in marriage and on refusal they defeat the fathers of the girls concerned and force them to marry their daughters to them. Such instances can be put under the Rākṣasa type of marriage. Lakṣmaṇa's marriage with Vidyādhari Manoramā (ch. 90), Aṅkusa's with Kanakamālā (ch. 98) belong to this type.⁹

On some pecuniary benefits Ratnābhā, a merchant's lady betrothed her daughter, Guṇamatī to Śreṣṭhin Śrīkānta, though she had been already betrothed to Dhanadatta by her father (103·12). This is an example of Āsura-vivāha¹⁰. But in this case the results were fatal and the marriage could not be performed.

The *Jātakas* (219 & 458) corroborate this type of marriage in which a wife is purchased. In the *Raghuvamśa* (11·38)

of *Kālidāsa* there is an indirect reference to this type of custom.

Svayamvara: The *Paumacariyam* reveals two forms of 'svayamvara' marriage, viz., the selection-type and the contest-type. In the former case many candidates are invited by the father of the bride and the bride then chooses any one of her liking as her husband. Kaikeyī's (24·10) marriage with Dasa-ratha, Subhadra's¹¹ (29·136) with Bharata, Khecarī Candramukhī's and Mandākinī's with Lavaṇa and Ankuṣa respectively (106·9), Vidyādhari Sṛimālā's with Vānara Kiṣkindha (6·159) and Khecarī Ahalyā's (Āhalyā) with Ānandamālin belong to this category. On such occasions bitterness was created and the disgruntled candidates made a row and sometimes waged a battle (6·176; 24·19; 106·14). It will not be out of place to mention here that svayamvaras of two sisters Candramukhī and Mandākinī were held simultaneously at the same place and the svayamvara of Subhadra was arranged immediately after that of her cousin sister Sitā. The former was a selection-type and the latter a contest-type. In the contest type candidates had to perform the proposed feat and whoever became successful, won the hand of the bride. In the case of Sitā the bow was to be strung up (28·104) while in the case of Jitapadmā the 'satti=sakti' hurled by the father of the bride was to be withstood (38·25). In the former case many candidates assembled on the proposed day and tried their might while in the latter case one by one came and went away unsuccessful. Days passed and when Lakṣmaṇa happened to go there, he emerged successful.

In the contest type of svayamvara wishes of the bride did not get any consideration. It was the father who proposed the test and offered his daughter to the successful candidate. He had the choice of not inviting the candidate who was not liked by him. Therefore, it can be affiliated to the Prājāpatya type of marriage. But in the selection type the bride was free to select the candidate of her own choice and it must have depended on the individual candidate whether to attend the

ceremony or not. Thus the willingness of both the parties was the deciding factor and it can be associated with the Gāndharva type of marriage.¹³

Marrying Maternal Uncle's Daughter: There are some instances of sons-in-law who address their fathers-in-law as 'māma' (24.22; 38.46). It reminds us of the custom of marrying the daughter of a maternal uncle and this custom was so widely prevalent that 'māma' became almost a term of address to the father-in-law. Lakṣmaṇa's wedlock with Viśalyā who was the daughter of the brother of Kaikeyī was of this type though Lakṣmaṇa was a step-son of Kaikeyī (64.17, 45) (See also 41.56, 59). This type of marriage is corroborated by one instance in the *Ṇayakumāracarit* (7.9.9). It is still prevalent in South India. This custom is popular among the Gonds.¹⁴ The *Āvasy-akacurni* (II, p. 81) mentions that this type of marriage was prohibited in the Uttarāpatha. Manu (11.171) does not approve of this type of marriage but Āpastamba¹⁵ is said to have enunciated this custom.

Polygamy and Dowry: Polygamy was quite sufficiently prevalent among the rulers whether they were the Kṣatriyas (10.36; 91.12, 17; 107.4; 98.2), Rākṣasas (74.12) or the Vānaras (104.49).

There is no reference in the *PCV* to the custom of demanding dowry.

Inter-caste Marriages: The *Paumacariyam* clearly reveals that in those days inter-caste marriages did take place.

It has been already discussed that the 'kula', 'carita', 'rūpa' and 'āyu' were the main factors upon which depended a marital-union. There is no instance to show that only the Varṇa was considered as the primary factor in forming wedlocks. The following examples of 'anuloma' and 'pratiloma' marriages indicate that inter-caste-marriage was prevalent. Purohita Piṅgala's love marriage with a princess (26.8) and (Brahmin) Śrīvardhita's Rākṣasa-marriage with princess Sundarā (77.85) fall under 'anuloma' type. A Brahmin woman though

abandoned by her husband was accepted by king Kararuha as his honoured wife (77·75). King Svayambhū and some princes (103·97) did not hesitate in demanding the hand of the girl of a higher caste (Brahmin girl-Guṇamati). These two instances are of 'pratiloma' type.

Inter-racial Marriages : As regards inter-racial marriages there were no restrictions among the non-Aryan people. The Aryans also did form wedlocks with the non-Aryans. Inter-racial marriages were very common with the non-Aryans. Rākṣasa Rāvaṇa married many Vidyādhara (Mandodari 8·18, and others 8·38; 9·51) or Khecara (9·53), and Vānara (Sriprabhā, the sister of Sugriva 9·50) girls. Khecara or Vānara Hanumat had married the Vidyādhara (Satyamati 19·32), Rākṣasa (Anangakusuma 19·34 and Laṅkāśundarī 52·21), Vānara (Hari mālinī 19·36, Padmarāgā 19·41) and the Kinnara (19·36) girls. Vānara Sugriva's wife, Tārā was a Khecarī (10·2). Vānara Kiśkindha was the husband of Vidyādhari S'rimālā (6·175). Khecara Pavanañjaya formed marital-union with Vidyādhari Añjanā (15·38). The non-Aryans did like to form wedlocks with the Aryan girls. Rāvaṇa kidnapped Sitā and requested her to marry him. He himself married the daughter of king Maruta of Rājagṛha (11·100) and many other Aryan girls (Vijjāharamaṇ-uyāṇa¹⁵ kannāo parīnei Dasāṇaṇo (9·51). Vidyādhara Candragati demanded Sitā for his adopted son Bhāmaṇḍala (28·56). Rākṣasi Candranakhā wanted to marry Rāma (43·45). The Aryan people did not hesitate in forming wedlocks with non-Aryan girls and kings made them even one of their chief queens. Rāma had married three daughters of Vidyādhara Gandharva¹⁶ (51·25) and one more Vidyādhari, namely S'ridāmā (90·28). Lakṣmaṇa married four daughters of Khecara Samudra¹⁷ (54·42) and also Vidyādhari Manoramā (90·28). Vidyādhari Manoramā was one of the eight principal queens of Vāsudeva Lakṣmaṇa (91·16) while Vidyādhari S'ridāmā was one of the four chief queens of Rāma (91·18) Lavaṇa and Ankusā married Khecara girls in the 'svayamvara' type of marriage (106·9). King Sumitra was married to Vanamālā by the latter's

father who was a Bhilla, also called as an Anārya chief of the Mlecchas (12·13-14).

Other literary evidences also corroborate inter-caste marriages. According to the *Mahābhārata* sage Cyavana married princess Sukanyā (anuloma) and Duṣyanta married Śakuntalā presumably the daughter of a priest (pratiloma).¹⁸ The Buddhist Jātaka No. 250 refers to a marital-union between a Brahmin and the chief wife of a king. Shri Gokuldas De observes that caste-rigidity was not observed because the terms 'sama-jāti-bhāriyā' is not used in verses and its use in prose betrays its later age in the Jātakas. The word 'sadisi' i.e. 'the same type' denoted age 'tulyavayā' and not the caste.¹⁹ The 'Varṇavarāḥ' as mentioned in the *Mālatīmadhava* is a reference to one inter-caste marriage.²⁰ Prince Nāgakumāra is said to have married dancing girls and his father supported him saying that a woman-gem could be accepted without any consideration of family (akuliṇu vi thīrayaṇu laijjai).²¹ Certainly these are mere literary evidences, but the actual events of the time of the Vākāṭaka-Gupta age show that 'anuloma' and 'pratiloma' marriages took place in the society. A record describes the marriage of a Brahmin groom with a Kṣatriya bride as perfectly in consonance with the rules of *Śrutis* and *Smṛtis*.²² Vākāṭaka king Rudrasena, a scion of an orthodox Brāhmaṇa family married Prabhāvatī Gupta of the Vaiśya Gupta family.²³ The Kādamba rulers who were Brāhmaṇas by caste had married their daughters to the Vaiśya Guptas.²⁴

Manu (3·4) and Vātsyāyana (*Kāmasūtra* 3·1·1) declare that marriage should be performed in the same 'varṇa'. Still we find that caste-flexibility is maintained and therefore the 'anuloma' (Manu·3·12-13) and the 'pratiloma' (*Yājñ*·1·93) marriages are recognised by the *Smṛtis* also.

As regards the inter-racial marriages we find that the Ikṣvāku Brāhmaṇa kings accepted a bride from the Śaka royal family of Ujjayini and Sātavāhanas had done the same in an earlier period.²⁵ The preponderance of inter-racial-marriage-

instances in the *PCV* points out the miscegenation of various tribes going on in those days and certainly since before the *Vākātaka Gupta* age it has been an important way by which foreign tribes have been absorbed into Indian Society.

REFERENCES

- ¹ Hereafter *PCV* indicates *Paumacariyam*
- ² 'Pradānam svāmyakaraṇam', *Manusmṛiti*. 5.152
- ³ 'Uttamapurisāṇa jae samjogo hoi uttamehi samam, ahamāṇa majjhim-āṇa ya sariso sarisehi vā hojjā' *PCV*. 6.19
- ⁴ This custom is still in vogue among the Gonds. See *Nāyakumāracaritu*, p. XXVII, ed. by H. L. Jain
- ⁵ *Bhagavati Sūtra*. 11.11.430, see also *Nāyakumāracaritu*. 1.17.1; 5.2.13-14.
- ⁶ The *Kāmsūtra* (3.5.29-30) extolls this type of marriage in which mutual love is the foundation and goal of marriage.
- ⁷ *Manu* (3.25) regards this type of marriage legal in the case of the Kṣatriyas.
- ⁸ *Ādiparva* 44.10 – vide P. N. Prabhu's *Hindu Social Organisation*, p. 178 (1954).
- ⁹ *Manu* (3.24, 26) approves of this type of marriage for the Kṣatriyas.
- ¹⁰ *Manu* (3.24) gives consent to it for the Vaiśyas and the Śudras.
- ¹¹ It was a mock svayamvara because the marriage was presettled.
- ¹² See *The Age of Imperial Unity*, p. 560 (B. V. Bhawan. 1953).
- ¹³ Vide. *Nāyakumāracaritu*, p. XXVII.
- ¹⁴ *Ibid*.
- ¹⁵ Here the word 'maṇḍyāṇam' means the Aryan girls.
- ¹⁶ See Raviṣa's *Padmacaritam*. 51.46.
- ¹⁷ *Ibid*. 54.66.
- ¹⁸ *Mahābhārata*. 3.122f; 1.71, vide *Heroic Age of India* by N. K. Siddhanta.
- ¹⁹ *Significance and Importance of the Jatakas* (1951), p. 112.
- ²⁰ *India in Kālidāsa* by B. S. Upādhyāya (1947), p. 185.
- ²¹ *Nāyakumāracaritu*. 3.7.8.
- ²² See *The Vākātaka Gupta Age* by Dr. A. S. Altekar (1954), p. 315.
- ²³ *Ibid*.
- ²⁴ *Ibid*.
- ²⁵ *Ibid*. p. 316.

A NOTE ON THE URBAN GROWTH IN SAURASHTRA

P. H. PAREKH

K. H. Madhvani Arts and Commerce College, Porbandar

Saurashtra is one of the most highly urbanized regions in India. The percentage of urban-dwellers in Saurashtra is almost 33%, i.e. one in every three persons is living in urban areas. Urban growth in Saurashtra is not a recent phenomenon, though it has been accelerated since the attainment of independence. This high rate of urbanization in the absence of high economic development, at least till independence, is rather surprising. The explanation generally given for the high rate of urban growth in Saurashtra is political. Before the merger of the native states and the formation of the Union of Saurashtra, Saurashtra region had the highest concentration of native states in India, out of which about a dozen states were comparatively bigger and richer than the rest. All these states had their capital cities with palaces, Government offices and other public buildings, private houses of high Government officials and the local gentry, etc. Some of these cities had modern hospitals and almost all of them had high schools. Moreover, all possessed good roads, water works and electricity. These had given to the towns and cities of Saurashtra a real urban look in contrast to the rural look of many towns in India outside Saurashtra.

What has been said of ancient Rome by Helen Loane can be said of the capital cities of Saurashtra of pre-independence era. According to Helen Loane, Rome was "the residential centre of the ruling classes" and "primarily a city of homes." (quoted by Dr. Ghurye in his *Cities and Civilization*, page 205.) The comparison is only qualitative. Rome being the capital of a vast empire was a metropolis, while the cities of Saurashtra are comparatively much smaller.

The above explanation of the high rate of urbanization in Saurashtra is, no doubt, true. But, I think, it is only partially true. The other reason, equally if not more important, is what for want of a better term, I would like to call "parasitism". By parasitism I mean the growth and prosperity of towns based not on local economic development but on the investment (in land and buildings) and consumption of income derived from outside of Saurashtra, in India itself or abroad. Saurashtra has been famous for its resourceful and enterprising merchants since antiquity. The existence of many towns and ports like Vallabhipur, Mangrol, Ghogha etc. bears this out. The far-flung nature of the enterprises of those merchants is also corroborated by many popular proverbs.

These merchants are spread all over India and hundreds and thousands of them have gone to Burma, Malaya and almost all parts of Africa. They have not severed their connections with their motherland. Part of their income they invest and spend in Saurashtra. They prefer to live in towns and build good residential buildings in these towns which add to their urban look. Marriages are generally celebrated here. Moreover, many of these merchants carry on their business as joint-family enterprises. Often various members of these families live by turn in Saurashtra. Their demand for various consumption goods give great fillip to local trade in cloth, cutlery, hosiery and various articles of house-hold use as well as of luxury. The existence of many towns creates an urban attitude in the surrounding countryside and farmers also get accustomed to buying and using many gadgets of modern civilization.

Parasitism is inherent in urbanization, as towns and cities have always been parasitic on the country. This has been recognised by both historians and sociologists.

M. Grant, an historian of the Roman Empire, writes : "The cities were economically parasitic on the country. Land was always the best investment, and a community's trade and industry largely depended on the incomes which the urban aristocracies,

as absentee landlords, drew from the peasantry. Thus the population of the rustic areas and villages round a town was in most cases reduced to an even lower standard of living than the proletariat within its walls." (quoted by A. Cobban in his book *The Social Interpretation of the French Revolution.*)

Cobban himself shows, in the above mentioned book, how before the French Revolution French towns dominated and exploited the country. He further shows that the peasant revolt of 1789 was a manifestation of the fundamental and age-old conflict of country against town. The contemporary economists of the Physiocratic School also pointed out the same phenomenon. W. Stark in his book *The History of Economics in Its Relation to Social Development* gives the physiocratic view of towns. Stark tries to show in this book that various economic theories are always the outcome of the contemporary conditions. I am, however, not concerned here with that thesis. My concern is with the physiocratic view of towns which I find here. As is well known the physiocrats considered cultivators to be the only productive class—'Class productive'. The nobility—class des propriétaires—possess the land and amass the surplus created by the peasantry. According to Cantillon, a physiocrat, towns arise where landlords settle who draw merchants and craftsmen after them: their greatness depends on the nobility residing there. "The size of the city is naturally proportioned to the number of landlords who live there." (page 18). They govern the market and give to production and commerce their task and direction. According to Quesnay, another physiocrat, if industry produces articles of utility for people at large it can be called productive. But if it only produces luxury articles for the nobility, then it is unproductive. Therefore tradesmen who for the fashionable society of Versailles, produce coaches, wigs, knick-knacks, brocades, mirrors, tapestries, powder and snuff-boxes were like chamber maids and stable grooms, in short menial servants; they belonged to the sphere of consumption and not that of production. Thus Pre-Revolutionary Versailles was a parasitic city 'par excellence'.

Over and above the usual type of parasitism inherent in urbanization, another type of parasitism pointed out above is associated with, and seems to account for, the high rate of urban growth in Saurashtra.

Since independence, however, much commercial and industrial development has taken place and that is the third reason for the high urban growth in Saurashtra. Due to the development of small-scale industries and the establishment of an industrial estate Rajkot has almost reached the population of two lakh souls and has outstripped Bhavnagar as the first city of Saurashtra. Big factories have also come up in centres like Porbandar, Veraval, etc. Ports are being developed. With the merger of the native states have disappeared the various customs barriers and, moreover, a unified transport system has come into existence, both of which have given great fillip to commerce. Social and cultural mobility has also greatly increased.

Social and political implications of the high rate of urbanization

Towns have always been the centres of dissemination of urban attitudes, values and culture. Till the attainment of independence towns in Saurashtra could perform this cultural role to a very limited extent because of the autocratic regimes of the feudal princes. But after independence towns have come into their own in this respect and are performing their usual cultural role and are rapidly transforming the face of Saurashtra. The fact can be illustrated from my own observation in Porbandar. In 1959 an Arts and Commerce College was started here. At about the same time a big chemical factory came into existence. Both of these have proved themselves to be big agencies of social change. Porbandar was a very backward city, almost medieval in its social outlook, where even husbands and wives could not walk together and women could hardly stir out of their homes. Today women have begun to move freely and couples can be seen on the roads. Porbandar has got a very beautiful sea-shore, part of which is called 'Chowpaty'.

It was the least frequented part of the city. Today it has become a usual resort for an evening walk and hundreds of people flock to Chowpaty on Sunday evenings.

Politically speaking, multiplicity of towns is likely to lead to a vigorous growth of democracy. For one thing town-life sharpens people's intelligence and increases their political consciousness. Secondly, no single city can dominate the political life of the whole region as Paris dominates the political life of France. The municipalities of various towns and cities of Saurashtra seem to be in a sort of competition in providing various civic amenities and facilities to their citizens. It is, however, a matter of regret that this spirit of emulation does not always take such healthy forms; witness the claims and counter-claims put forward by various cities for the establishment of the headquarters of the proposed Saurashtra University and the linking up of Saurashtra with Gujarat by a broadgauge railway. But if the local civic pride can be kept within proper bounds it can lead to a vigorous growth of democracy as opined above. Otherwise by their internecine quarrels the cities of Saurashtra will only hamper the progress of the region as a whole. One is tempted to compare their quarrels with those of ancient Greek city-states. The analogy, of course, cannot be pressed too far. Those cities were independent sovereign states. They, therefore, could indulge in military warfare and bring ruin upon themselves in the process.

The urban growth in Saurashtra has its own distinctive pattern, which needs to be seriously studied.

SUMMARY OF THE REPORT ON INVESTIGATION OF UNDERWEIGHT STUDENTS OF GUJARAT UNIVERSITY

E. M. BEST : B. N. MAZUMDAR : R. M. VAIDYA

C. I. JHALA : A. N. BHATT

B. J. Medical College, Ahmedabad-16

Summary

One hundred students comprising 78 males and 22 females, selected at random from different faculties of the Gujarat University all belonging to first academic year of 1962 and 1963 were investigated, to study the cause of underweight in Gujarat University students.

Investigations included past and family history of any illness, physical and laboratory examination, habit, sanitary conditions of the residence and diet of the students and number of members in family, their height, weight and income conditions.

83% of the students belonged to a degree of underweight 11 lbs. to 30 lbs. less than their expected normal weight. 56% of the males and 45% of the females fell in the range of 11 lbs. to 20 lbs. less than normal. With 81% underweight students, other members in the family were also found to have underweight.

About 10% of the underweight students had chronic illness like tonsillitis and 14% suffered repeatedly from upper respiratory tract infection. Other illness in the past included typhoid, malaria and dysentery. In the family, subjects of diabetes mellitus, asthma, hypertension, tuberculosis and cancer could be traced.

General physical check up did not reveal any abnormality except underweight. At age of 17 years, average chest girth and that after full expansion were found to be 27.7" and 29" respectively compared to the normal standard of 29.40" and 31.22" respectively as worked out by Vashi.

In 90% of the students hemoglobin varied from 10.0 gms.% to 13.0 gms.% and the average was 11.5 gms.%. The subnormality of hemoglobin level was spread equally in males and females.

In 93% of underweight students, red cell count was 4.5 million per cubic millimeter or below. Average red cell count was 3.7 mil./c.mm. It was also equally distributed in males and females.

50% students on the average, Nearly (90% female students and 40% male students) did not undertake any physical exercise even not a routine walk. 20% took to cycling and 40% to walking (all being male students).

Diet consumed by these students had been found to be nutritionally poor. Total calories, consumed was much less compared to the minimum prescribed by Indian Council of Medical Research (27% less). It also lacked in total protein, specially animal protein, i.e. protein of high biological value. Vitamins, particularly vitamins A and C, were inadequate. In certain families, who could afford to spend sufficiently for food were having inadequate diet due to lack of knowledge of a balanced diet.

Environmental factors investigated, show that about 79% of the families of underweight students lived in pucca house while 21% lived in house made of mud and brick covered with patra. Ventilation was found to be good in 79%, fair in 14.5% and bad in 6.2%. A separate bathroom was found in 50.4% houses. 17% of students lived in one room tenement with an average of 5.9 members per room.

In the study of the socio-economic status of the family of such students, it was found that clerks and those engaged in administrative services were the worst sufferers constituting 30.2 and 21.8 per cent respectively. Eleven families had members numbering 10-12 and 32 families between 7-9 members. A close relation between per capita income and the number of underweights in a family was found. Sixty-one families had income between Rs. 100/- and Rs. 400/- p.m. and out of these 75% families spent more than 50% of their income on food and even then the students there were found underweight.

PHILOSOPHICAL CRITICISM OF FREUD'S VIEWS

Scientific truth—Impact of Freudian view—Unity : highest aspiration of philosophy—Status of opposition : philosophical criticism—Life and death instinct—Sex-instinct—Evolution and Consciousness—Nature of Supreme Reality—Process of Reality and opposition—Nature of sex-instinct—Desire and total cure—Nature of unconscious—Dream and unconscious—Suppression and subconscious Melady and its removal—Superconscious and subconscious.

Harsiddh M. Joshi

*Gujarat College
Ahmedabad-6*

Scientific truth

All fundamental seeking of truth presupposes ultimately a unified vision of the world in which all things of the world are shown to be interrelated and serving the purpose of each other. Such vision gives satisfaction to intellectual pursuit. Scientific study fails to give satisfaction because it is departmental knowledge and it is limited. This process is justified and necessary. Without scientific study we would not get knowledge of details and if science is aware of these limitations the effects of science would be salutary. It is when a science knowing its limitations tries to apply its method to other subjects or asserts it to be the only knowable science that difficulty arises and both these have happened in the history of thought. It has been maintained that scientific truths are philosophical truths and that science alone is possible, philosophy is impossible. Sigmund Freud tried to establish his theories universally. To unripe mind he gives impression of both a scientist as well as a prophet.

Impact of Freudian view

Today people believe that psychology is nothing but psycho-analysis and even the most educated people believe that Freud is irrefutable. Such a hold on mankind can be effected

Paper read at the thirty-eighth session of the Indian Philosophical Congress to be held at Madras in Dec. 26-30, 1964.

only when it becomes dangerous. Of half-truths one can easily be convinced and their sweep is great. Some serious students of Psychology do have objections against Freud's principles, but still they give him the credit of discovering the unconscious. They disagree with the exclusive emphasis upon sex instinct but believe that unconscious influences much upon consciousness. This, however, is not true. The unconscious does have morbid influence upon consciousness in rare cases, but consciousness is not a product of unconsciousness. It is 'Sui generis'. It exists by itself. Unconscious does not give birth to what is conscious, rather consciousness takes birth in the unconscious like lotus in the mud and explanation of lotus is not mud.

Unity : highest aspiration of Philosophy

A unified vision of things which is not opposed fundamentally to science can criticise scientific conclusions. It may welcome the systematic data of science but may criticise the theories and interpretation of data. A scientific theory is subject to philosophical criticism and in order that scientific theory may be accepted in philosophy, it has to be consistent with the whole philosophical vision. Similarly a philosophy which does not confirm with the inward spiritual experience is subject to criticism and is not accepted as having a final validity. In Indian tradition, there is a gradation of knowledge such as in the first instance, scientific knowledge, then philosophical contemplation and finally spiritual experience. It was this gradation which prevented Indian knowledge from much of wastage produced by various seekers of knowledge. It also eliminated many errors which arise by perception of facts and by use of ideas and words so prominent in philosophy. In the West, generally speaking, spiritual experience is not regarded as having anything to do with Philosophy. Philosophy is regarded as an independent inquiry which may even criticise spiritual experience by instrument of reason. As to the relation between philosophy and science there is a confusion prevailing over in many parts of the West, so that many philosophical theories are regarded

as scientific and vice versa. Freudian theory is regarded as philosophical as if Freud had found out the meaning of life, nature of man and universe.

Status of opposition : Philosophical criticism

The highest truth is all-comprehensive and it covers the whole universe in its reach and compass of experience and its interpretation. In doing so, it reconciles all opposites. In this sense, Freudian system is not a philosophical theory in so far as it posits an ultimate polarity or opposition. Wherever there is an ultimate opposition there is ground for further enquiry. Whatever opposition there may be, both must exist. Existence is common between the supposed terms of opposition. The reconciliation of opposition is found in the concept of existence in which there is no opposition. If there is an opposition there must be some intermediary truth between the existence and the opposition. If existence is not, then what is it? By trying to deny existence even one affirms it. This argument is as old as Plato who postulated ideas to explain the commonness of things. He postulated an ideal world of archetypes of which things in the world are copies. All philosophers do not accept this conclusion that philosophy aspires to reach towards a synthesis and unity. It can, however, be justified.

An attempt to arrive at unity is not found in the system of Freud. Samkhya philosophy also postulates a polarity between Purusha and Prakriti both having opposite characteristics. As a matter of fact, it is a truth of certain level of existence, but not as a matter of highest philosophical aspiration. Therefore we may pronounce Freud's theory as unphilosophical. But it may be said that philosophical truth is not binding on all parts of one's being. Then what is intellectually false may be true in experience. It is true that there is an opposition between ego and environment, ego and the super-ego, profane and sacred, sex and reason. Such opposite drives have truth in experience.

But here again there is a gulf of difference between Samkhya and Freudian polarity. There are grades of opposition

and the value of the opposition depends on its range and grade. The opposition between Purusha and Prakriti is arrived at when one transcends the mental consciousness, whereas Freud observes his polarity in the most ordinary life. In Indian Psychology, amidst all vital and mental experience, thought has a *nisus*, a thirst which seeks rest and origin of itself. This origin can be attained only after transcending the mind. Vital existence is dual and the recognition of this duality is on a very low plane of experience. The higher the opposition, greater its value. On the higher plane there is still the dichotomy between personal and impersonal, static and dynamic, conditioned and unconditioned, finite and infinite. True philosophy reconciles all these opposites and posit an infinite Reality in which all opposites are transmuted. This then is a possible criticism of Freud's view of unconscious and consciousness from philosophical standpoint.

Life and death instinct

Earlier Freud had found polarity between libido and ego but later found life urge containing both libido and ego. There must, however, be opposition, so he was led to postulate death instinct. There must be, he believed, a primal, unconscious drive towards death, and it must be present in every individual from the beginning to the end of his life. Just as the libido is generated within the organism but attaches itself to external objects, so also with death instinct. It manifests itself for the most part not as a desire to die but as a desire to kill. This, however, is not true. Every change is akin to death. The very condition of entering into life is death. From occult point of view, death is only a passage in chain of life.

Sex-instinct

The third point which we might discuss is his emphasis on sex-instinct. Sex, according to Freud, is fundamental to human nature. It is irreducible. The urge for sex-satisfaction is the sole motive of human existence and all our conscious life is a record of this drive trying to manifest and satisfy itself.

The very fact that sex-instinct meets with an opposition from the principle of Reality should have shown Freud that sex is not fundamental in human nature. Is man necessarily opposed to nature? There is in man something other than sex-instinct because of which it subdues itself to external reality. Both Adler and Jung held that sex was not as fundamental as Freud thought.

Adler maintained that 'Will to power' was more fundamental. Jung held that the tendency to integrate different aspects of personality was more fundamental.

This, however, does not mean that Jung and Adler are right, but it shows that even by working on the same plane with similar data, different interpretations are possible. Freud's view is not a fact but a theory. We accept Freud's data but not his theory and see that they can be better explained on another hypothesis.

Evolution and consciousness

There is a fundamental process in nature as a whole which is one of gradual development, an evolution from an absolute apparent absence of consciousness toward a complete manifestation of consciousness. This developing consciousness undergoes certain stages which it always carries with it on its forward march. Therefore the consciousness in man carries with it principles of matter and life, forerunners of evolution of consciousness. These principles of matter and life become subject to a new principle of evolved consciousness. Mind is our present principle of consciousness subjecting matter and body, life, emotions and impulses. But mind itself is still a limited instrument of consciousness. There is a constant struggle between body, life and mind and this is a complex phenomenon. In general, all the phenomena can be explained in terms of a struggle for the evolution of higher and still higher consciousness and its power.

The upshot of this hypothesis is that any unconscious urge is not fundamental but consciousness is the capital factor in the development of man. This would not reject the facts of

sex-life. They would be accepted as necessary elements of a certain stage of development, but not binding or inevitable on the higher levels of consciousness.

Nature of Supreme Reality

As an alternative to Freud's theory there is a philosophical hypothesis according to which the Supreme is the ultimate of all things. This Reality is ineffable and indefinable. But such a Reality is presented to our consciousness in certain form which our mind can grasp and conceive and give us a positive information as to its nature. This Reality, so conceived by intellect, is at once static and dynamic. In its static aspect, it is essence whereas in its dynamic aspect it is manifesting consciousness. Therefore whatever comes in the formulation has behind it an established essence. The dynamism is force not determined by anything else, free even to remain quiet and static. The world of manifestation is a result of the freedom of Reality.

The positive attributes of Reality are pure existence (Sat), consciousness (Chit), and delight (Ananda). Therefore in the world we should find transcription of these three fundamental aspects. But in the world we find exact opposites of these three attributes of Reality. Instead of bliss we find pain and evil, instead of consciousness we find ignorance and blindness, and in place of stable existence we find only mutability.

Process of Reality and opposition

We have to explain these opposites in terms of the ultimate nature of reality. Our hypothesis is that these opposites are results of a particular will on the part of the supreme to manifest himself not fully but through a mask. So there has been a process of involution resulting in the inconscient. Inconscient is the starting point of the process of evolution. But the inconscient itself presupposes certain planes of existence fundamental to it. There are planes of subtle matter, life, mind and higher existence. The Supreme is involved in inconscient just as consciousness is present even in sleep.

The fundamental truth behind matter is Sat aspect of Reality, the pure existent. Life is conscious force in its development. Mind is the pure and Real Idea in its manifestation. Ananda assumes the nature of psychic being (Chaitya Purusha) in the individual when it undergoes the process of evolution. One of the characteristics of fundamental existence is its eternity or timelessness. If something is inherent in existence it will always present itself as soon as there is beginning or manifestation. Matter, life, mind and psychic being are such inherent principles so that when there is manifestation they will arise. There is a separate category besides what is inherent in the supreme. It is a consequence emerging out of the limitation which is one of the powers of the supreme. It is ignorance with its resultants. This will disappear when limitation is eradicated.

Nature of sex-instinct

We shall examine whether in this view and hypothesis sex instinct could remain at a higher stage of evolution. This will, however, depend on the ultimate nature and root of the instinct. Sex, as we find it, has two aspects, viz., physical and emotional. In its physical aspect it is an instrument for reproduction whereas in its emotional aspect it gives rise to excitement and pleasure. Moreover, behind sex-instinct most significant element is that of desire. What is the origin of desire and its function? Desire cannot be ultimate because it presupposes something to be attained or to be overcome. The Supreme, if he acts, does not do so by any impulse or the force of desire. The Supreme is not compelled to manifest nor not to manifest. There is therefore a poise at which action is possible without any sense of compulsion. Such free action belongs properly to the Supreme. Since the whole universe is manifestation of supreme power there is no element of desire unless at some layer of existence the Supreme is veiled or Supreme withdraws its omnipotence. We postulate such an act of self-limitation or that of veiling and maintain that Supreme in process of evolution gradually withdraws its consciousness and permits the activity to work itself out by being merged into activity.

Desire and total cure

The energy working without consciousness begins to feel separated and therefore feels separated and therefore feels a certain struggle to swallow and embrace others to become infinite. To maintain itself and aggrandise is the core of desire. If this cutting off is conscious, then it would not have had tendency to swallow others. When the energy undergoes a transitional phase and does not reveal its nature of omnipotence then it seeks to aggrandise. Thus desire is a result of limitation and incapacity. Desire is not ultimate. In the full integration and manifestation of personality there is no place for desire. Therefore in our ascent to the Supreme one important condition is the rejection of desire. All that is impelled by and is a resultant of desire has to be rejected. In doing so alone we would find our true being, the true health of body, life, mind and soul.

It is true to say that rejection of desire is itself a desire. In Upanishads it is said, 'Attain to Vidya through Avidya'. Therefore the process is such that we must go backwards to conquer petty desires, utilise desire till no desire is left. This is the truth behind ego and ignorance that it is an approach to liberate ourselves from the tyranny of duality and multiplicity.

Proper development of consciousness lies in the rejection of desire. Therefore all theories which hold that one should satisfy desires are erroneous. This does not mean that desires should not be gratified at all. One should desire for higher and sublime objects until ultimately one finds that desire is a mask of the supreme person and at that plane of existence one must give up desire. Yoga is meant for one who has rejected desire and then to indulge in desire would be an error for it is found that it is a mask.

Nature of unconscious

The concept of unconscious requires to be reoriented in the light of above hypothesis. In the system of Freud this concept has two aspects: (1) as used in explanation of the conscious life, and (2) as used in explanation of dream life. At one

time it was believed that dream life is illusory, unsubstantial and unreal. (Descartes while doubting said that in dream though one sees oneself doing an activity, it is unreal. In Shankara's philosophy in order to show the unreality of world and life it is compared to a dream.) Psycho-analysis has done great service in bringing out the truth that dream life is real. It is connected with waking life; it is a part of the whole of human experience. There are three principles laid down here. Firstly, dream is regarded as special function of the unconscious. Secondly, it holds that all dreams are significant. And thirdly it identifies unconscious with the vital subconscious.

Dream and unconscious

But dream is not the special functioning of the unconscious for the subliminal is greater dream builder. Psycho-analysis does not distinguish all that is subconscious from that which is subliminal. Secondly all dreams are not significant for there are dreams which are purely fantastic, pure construction and play of imagination. Psycho-analysis would be labouring under a wrong lead if it explained the entire waking life by all dreams. It is largely in the subliminal that dreams are significant. Recent investigations of parapsychology have opened the vast realm of the subliminal in which precognition through dream is accepted as probability. Thirdly, there are three aspects of the subconscious: (1) subconscious physical activity, (2) subconscious vital activity, and (3) subconscious mental activity. The dumb submerged consciousness works in cells and neurones and adjusts them automatically. There is a sense-mind also operating in animals and man which is active and yet lying in subconscious. It is that part of subconscious in which all past impressions are stored and from which they can surge up. When Freud attributes neurosis to subconscious he is right but he limits the subconscious to what is called the physical subconscious.

Moreover, Freud fixes only one instinct out of many which are present in this part of subconscious and attributes all

abnormalities to the functioning of this instinct. He also maintains that this subconscious stores up the impressions of childhood affect the whole span of life. Childhood has indeed considerable effect on future life and it should be taken care of. But to attribute all to childhood is an exaggeration.

Suppression and subconscious

Finally all suppressions create complexes which may become causes of neurosis. But it is not only those things that are suppressed that merge into the subconscious, even those that we think, once rejected, drift into it and may spring up in different form. But none of these may create abnormalities.

In a sense suppression is healthy for the proper development of consciousness. Suppression engenders abnormality only when it is accompanied by a substitute gratification of the same activity-danger not expressed on face, but it is carried on within and creates disorder. But if suppression is followed by peace, silence and steady aspiration of consciousness then it does not create disorder on the conscious plane of being. This datum, however, is not acceptable to Freud who persists for opposition and polarity of physical and vital energies.

Malady and its removal

It is owing to the non-recognition of certain data of body, life and mind which reveal the possibilities of quieting, disciplining and establishing homogeneity among the seeming opposites of various planes of being that the psychoanalytic method instead of helping the patient complicate his problems. The method consists in showing him that such effects are results of suppressed subconscious emotions. And the idea is that a patient, knowing it, may work it out. But in fact, this revealing of subconscious may frighten the individual and may even aggravate the situation. (For what he had thought to have been conquered is shown to be suppressed in subconscious and may lead him to morbidity.) It is only when the patient is advanced and can see the subconscious objectively that such a

method may be helpful. This indicates the significance of nature or cosmic existence which consists of subconscious and subliminal.

The most helpful way of purifying and liberting oneself is another idea of Yoga in which one is told that physical, vital and mental complexes and forces arise from without or outside nature. This is true from the point of view of Purusha. All nature which is external is imposed upon Purusha. Since this is a truth greater than that of individual subconscious an individual can reject anything effectively.

There are two kinds of impurities which an individual should attempt to eradicate. One kind is that of fundamental ignorance and secondly a mixture arising out of evolutionary process in which one principle (higher) of being arises out of the lower one. Purification of consciousness would mean rejection of fundamental ignorance and secondly to establish a right relationship between various planes of our being.

The first kind of impurity manifests itself into the sense of ego attaching to limitations, desire and a partial reception of things mistaking itself to be the whole. The second impurity manifests itself into mind being besieged by vital elements and thus mind becoming a slave of desires; mind is clouded by physical inertia or obscurity.

The purification of consciousness consists in concentrating on the higher psychic being accompanied by rejection of lower movements. It is only when we attain to higher self and consciousness that a plunge into the subconscious becomes safe and befitting to the health of personality. The best method to liberate oneself is to believe that nature does not belong to Purusha and thus not to be open to the realm of the subconscious, within the fold of psycho-analysis of Freud it is not possible to get rid of the subconscious as the knowledge of subconscious is itself a variety of the subconscious. It is a vicious circle and the patient is rarely cured of the malady except by way of subconscious satisfaction. Moreover, subliminal too acts from behind on personal consciousness. Freud did not

recognise the subliminal consciousness now proved beyond doubt by parapsychology and hence he could not find the danger of experiencing and knowing the subconscious without any need of purification.

Superconscient and subconscious

Without the knowledge of the superconscient the unraveling of the subconscious becomes half-hearted search and partial satisfaction of vulgar curiosity. Knowledge of and mastery over subconscious are, of course, indispensable, but one should know when to take the plunge and feel its depth. One should just rise to the higher moral, aesthetic and imaginative aspects of psychic purity. Within us there is a poise of being entirely pure and this purity has to be emphasized by our concentration and everything else to be regarded as external to our inner true nature. This is the purity of psychic being. Once that purity is attained both the force and power of it may become down and purify lower parts. This then is the method of knowing, controlling and transforming subconscious—not the psychoanalytic method.

CURRICULUM CHANGE IN SOCIAL STUDIES

DR. JAGADISH P. DAVE

*University School of Psychology, Education and Philosophy
Gujarat University, Ahmedabad-9*

The state-prescribed syllabus lays down objectives to be accepted by schools. In the syllabus objectives are stated very briefly. The practice of stating objectives specifically marks a deviation from the "traditional" practice. During interviews, it was learned that this practice was followed by about thirty per cent of Group A schools and by about ten per cent of Group B schools (Group C schools were not interviewed). The practice of putting objectives in specific behavioral terms is very recent in India. Teachers from both groups of schools found it difficult to put the general objectives in specific behavioral terms.

During interviews, it was discovered that the "Project" schools deviated from the "traditional" practice mainly in the following ways. These schools formulated objectives in specific terms. In addition to the acquisition of knowledge these schools considered the cultivation of social attitudes and skills as objectives significant to their social studies programs. However, this kind of deviation from the traditional practice was found only in those grades in which the schools had undertaken "projects". In other grades, the schools largely followed the "traditional" practice.

Changes with respect to courses of study.—With respect to courses of study, the standard practice followed by schools is to accept the state-prescribed courses of study without much modification. It is also a standard practice to teach history, geography, and civics as separate subjects. A new movement

developed in the wake of the recommendations made by the Secondary Education Commission of 1953. In this new movement, attempts to modify courses of study have been made mainly with regard to the patterns of organization. Attempts have been made to teach social studies with formal or informal coordination of the various subjects or as one integrated subject. Those who have attempted to teach social studies as one integrated subject have tried to a certain extent to enlarge the "traditional" content of the subject by occasionally including content from subjects like economics, sociology, and literature.

About sixty per cent of Group A schools followed the practice of modifying courses of study "to some extent". This practice marks some deviation from the standard procedure. In comparison, about one-third of Group B and Group C schools followed this moderate practice. As for the practice of modifying courses of study "intensively and completely" Group A schools were alone. However, only one-fifth of Group A schools followed these practices which mark a maximum deviation from the "traditional" practice.

The schools which reported modification of courses "to some extent" were engaged primarily in coordinating history, geography, and civics by occasionally working on projects. It appeared to the investigator on the basis of the interviews that the projects provided them an opportunity to correlate the social studies. The schools which modified courses of study "intensively" and "completely" appeared to deviate from the "traditional" practice by directing their attempts largely to the integration of the social studies. These schools have broken down the artificial barriers separating the subject fields of history, geography and civics. Also, they seemed to have deviated from the state-prescribed syllabus by organizing the content around problems. In the state-prescribed syllabus the content is organized according to topics. Unlike the state-prescribed syllabus, these schools have outlined teaching procedures and techniques of evaluation. These schools found it difficult to modify courses

of study in all grades at the same time. They started modifying courses of study gradually on a grade-by-grade basis.

Changes with respect to methods of teaching.—Regarding the teaching practices, the “traditional” practice is to impart information by lecturing and dictating notes. As Bloom states, “In almost all these classes, the teacher spoke almost 90 per cent of the time ... learning appears to be a matter of covering a certain amount of subject matter in a prescribed amount of time.”⁴

Inquiries made regarding changes in methods of teaching pertained to attention given to individual differences of students, use of parallel textbooks (supplementary textbooks) and student involvement in different learning activities.

Compared to four-fifths of Group A schools, about one-half of Group B and Group C schools followed the practice of giving attention to individual differences of students. The schools gave attention to individual differences of students mainly by dividing students into groups according to their abilities and interests and by assigning them group work. Also, at times, they gave some extra work to the above-average students. In group work the above-average students were usually appointed as group leaders.

The main difficulties the schools faced in caring for individual differences were two-fold: (a) the schools had to cover the fixed amount of material in a fixed and limited time; (b) they were too burdened to find time to help the below-average and above-average students.

Compared to about half of Group B and Group C schools, about seven-tenths of Group A schools made use of parallel textbooks. Parallel textbooks were found to be widely used in the “project schools”. In most cases the teachers provided parallel textbooks to students seeking additional information about an assigned topic. The students used these books mostly

⁴ *Evaluation in Secondary Schools*, 2d ed. rev. (New Delhi: The Directorate of Extension Programmes for Secondary Education, 1960), p. 5.

to prepare themselves for group discussions. In the absence of suitable reference books written in the mother-tongue, parallel textbooks seemed to provide a handy and inexpensive source for supplementing the textbooks.

Compared to Group B and Group C schools, a much greater per cent of Group A schools had designed student-directed learning activities. In about one-half of the Group A schools, the students were engaged in such activities while working on their projects. The projects were of two kinds. Projects undertaken within the school included attempts to study various aspects of a country through the use of school library, audio-visual aids and expert talks. Projects undertaken outside the schools included such activities as conducting a survey of sanitary conditions in a village community or holding a camp to study multifarious activities of a community. Various learning activities such as participating in group work, making use of the school library, holding interviews, inviting experts for talks, writing reports, and arranging exhibitions were undertaken while working on a project.

In undertaking activities such as listening to school broadcasts and watching movies, Group B and Group C schools did not differ significantly from Group A schools. This might be due to the availability of facilities in the form of school broadcasts in regional languages made by the All-India Radio. Also, schools located in urban areas had easy access to the educational films provided free by the United States Information Service and the State Governments.

Changes with respect to evaluation.— The term "evaluation" as it is used by modern educationists is new to a large number of teachers in India. Most of them seemed to equate evaluation with the formal examination.

The dominant purpose of using the evaluation instruments in all types of schools was to get data to determine promotions. Regarding the traditionally accepted purpose of determining student promotions, Group A schools practically did not show

any difference from Group *B* and Group *C* schools. The tests were largely meant to measure the amount of information the student would have memorized. From interviews, the investigator learned that about one-third of Group *A* schools seemed to have made some beginning in using evaluation instruments to get data to help individual students, to improve methods of teaching, and to assess the critical thinking and skills of students. In most of those schools, the teachers seemed to experience great difficulty in acquiring and using the right kind of evaluation instruments. As a result, as one expert puts it, "Skills, interests and attitudes are not evaluated. So objectives do not fit in with evaluation tools."

Regarding the instruments of evaluation, about fifty per cent of all types of schools seemed to use achievement tests prepared by schools to be given to all classes. Group *A* schools did not differ significantly from Group *B* and Group *C* schools in the case of these tests. This is the "traditional" practice. About seven-tenths of Group *A* schools seem to have deviated from this practice by using special tests constructed by teachers for use in their own classes and about three-fifths of Group *A* schools by using recorded observations of individual students as instruments of evaluation. In comparison, about one-half of Group *B* and Group *C* schools used special tests and about one-sixth of Group *B* and Group *C* schools used recorded observations of individual students as instruments of evaluation.

The interview findings revealed that about seventy per cent of Group *A* and Group *B* schools had started the practice of internal marking while assessing student progress at the end of the academic year. The usual practice was to give twenty per cent weight to internal marking, based on the student's day-to-day class performance and his study habits. An important difference which the investigator found between Group *A* and Group *B* schools was that in general the teachers in Group *A* schools had a variety of learning situations such as preparing charts and maps and writing and making reports to assess student performance. In Group *B* schools teachers

mainly assessed student performance on the basis of turning in the home-work regularly and maintaining class discipline. Another important difference which the investigator found between the two sets of schools was regarding the use of rating cards to record teachers' evaluation of student progress. In about one-sixth of Group A schools this practice was followed. Group B schools did not seem to use such rating cards.

In order to know whether or not Group A schools made change consistently in various components of their social studies programs, a study of interrelationships of certain "progressive" practices followed by Group A schools in their social studies programs was made. A summary of the number of Group A schools that followed certain "progressive" practices is shown in Table 1.

Table 1 reveals that more than half of the Group A schools followed all other selected "progressive" practices except 2 and 3. The differences of this kind can be explained as follows: Practices 2 and 3, namely formulation of objectives completely independently of the state-prescribed syllabus and complete and intensive modification of courses of study, involve a considerable amount of freedom from the State Departments of Education. In order to follow these practices, schools would need bold educational leadership in initiating change, a competent faculty, and also a considerable degree of technical assistance from agencies of change. The questionnaire data and interview findings indicated that not many schools were equipped with these facilities. As such, more Group A schools seem to have followed other "progressive" practices than these two practices.

A strikingly large number of schools seem to have followed practices 1 and 6, namely formulating objectives on the basis of the state-prescribed syllabus and paying attention to students' individual differences. Compared to practice 2, almost twice as many Group A schools appear to have followed practice 1. The difference in the number of schools following practices 1 and 2

TABLE 1

Number of Group A schools using and not using certain "Progressive" practices in their Social Studies Programs *

Serial No.	"Progressive" practices	No. of schools using the practice	No. of schools not using the practice	No Response
1.	State-prescribed objectives	29	7	0
2.	Independently formulated objectives	14	22	0
3.	Courses modified intensively and completely	8	28	0
4.	Integration with social sciences	19	11	6
5.	Integration with social sciences and other subjects	23	10	3
6.	Individual attention	30	5	1
7.	Parallel text-books	26	8	2
8.	Evaluation for effective teaching	27	6	3
9.	Evaluation for teacher guidance	24	9	3
10.	Teacher constructed tests	25	9	2
11.	Observation of student behavior	21	13	2

* The following is the explanation of the code words designating "progressive" practices:

1. Objectives for the social studies formulated by the school faculty on the basis of the state-prescribed syllabus.
2. Objectives for the social studies formulated by the school faculty independently of the state-prescribed syllabus.
3. Courses of studies modified intensively and completely.
4. Social studies taught as an integrated subject with content from various social sciences.
5. Social studies taught as an integrated subject with content from various social sciences and other subjects.
6. Attention given to students' individual differences.
7. Use of parallel text-books.
8. Evaluation instruments used to get data to guide teachers in modifying content and methods of teaching.
10. Special tests constructed by teachers.
11. Recording observations of student behavior.

can be explained by the same reasons given in the preceding paragraph.

It seems reasonable to conclude that Group A schools, in general, followed the "progressive" practices consistently. When the practice required special conditions mentioned before, the number of schools following these practices was considerably reduced.

Findings pertaining to conditions associated with change — The findings reported in this section pertain to the relationship between curriculum change and the following conditions: (1) freedom granted to schools to evolve the social studies programs locally; (2) material and technical aid given to schools; (3) availability of facilities for the professional growth of teachers; (4) leadership displayed by headmasters; (5) the external public examination. An overall inquiry was made about the degree of satisfaction the teachers had with their existing social studies programs. Conditions 2 and 3 reported in the study were related to the social studies curriculum and not in general.

Freedom to develop social studies programs locally.— The "traditional" practice for schools is to accept the state-prescribed syllabus. With the establishment of the All-India Council for Secondary Education in 1957, some latitude was granted to some schools to make innovations in various subjects.

One-third of the Group A schools reported that they felt free "to a large extent" to develop programs locally. In a very few Group B and Group C schools such a feeling was expressed. Compared to about one-eighth of Group B and Group C schools, about three-fourths of Group A schools were engaged in the development of social studies programs locally. The schools which were granted freedom to develop social studies programs locally deviated from the "traditional" practice in two respects. About sixty per cent of Group A schools and about thirty per cent of Group B and Group C schools developed their social studies programs locally within the framework of the state-prescribed syllabus. About twenty per cent of Group A schools

developed their social studies programs locally by modifying the state-prescribed syllabus intensively and completely. In the first kind of innovation, the schools largely accepted the state-prescribed syllabus. The common pattern of change that the investigator discovered was in the form of one or two social studies projects undertaken by the schools during the academic year. In the second kind of innovation, the schools formulated their specific objectives, selected and organized learning activities, and followed special evaluation techniques.

Grade VIII seems to be the most favored grade for making innovations. The main reason for favoring grade VIII was that it is the starting grade of high school education. It was relatively easy to make innovations at the initial stage. The absence of pressure from the external public examination was given as an important reason for selecting grades VIII, IX, and X. Availability of competent teachers was given by the headmasters as an important reason for making innovations at these levels.

No teachers from any group of schools viewed freedom for developing social studies programs locally "not important". This fact indicates that teachers generally place a good deal of value on the freedom to develop social studies programs locally. However, teachers in each type of school did not feel as free to develop social studies programs locally as they would have liked to feel. The difference appears more striking in the case of Group B and Group C schools than in the case of Group A schools.

The findings tend to indicate that change is most likely to take place in those schools which are given freedom to develop their programs locally.

Material and technical aid.—With the establishment of the All-India Council for Secondary Education in 1957, efforts began to provide material and technical aid to schools to improve their instructional programs.

About three-fifths of Group A schools received material aid and one half of Group A schools received technical aid. On the other hand, about one-sixth of Group B schools and less

than one tenth of Group *C* schools received material and technical aids respectively. Material aid was received mostly in the form of grants and instructional materials. Technical aid was received mostly in the forms of project planning, lesson demonstration, in conducting workshops, and in evaluating the projects. The schools considered technical aid more important than material aid. Group *A* schools felt that the technical aid gave them new insight into curriculum change. They felt that the technical aid would be of great importance especially in the initial stage. The demand for both technical and material aids was heavier than the supply.

In general, the regional extension service centers, the All-India Council for Secondary Education, and the regional universities, appeared to have played an important role as agencies of educational change. It was learned during interviews that three-fourths of Group *A* schools and Group *B* schools seemed to have pinned great hopes on the regional extension service centers. However, it was held that much depended on the coordinator's tenure of service at the same center.

There seemed to be need to orient teachers to the right use of the instructional materials. Materials and teaching aids often lay idle because of the lack of adequate training on the part of the teachers.

From the findings, it seems reasonable to conclude that material and technical aid given to schools tended to facilitate change in the social studies curriculum.

Facilities for professional growth.— With regard to facilities for professional growth, in about eight-tenths of the Group *A* schools the teacher had contact with extension service centers, in about six-tenths of Group *A* schools they attended workshops, and in about three-tenths of the Group *A* schools they had contact with foreign experts. In comparison, in about four-tenths of the Group *B* and Group *C* schools the teachers had contact with extension service centers and they attended workshops. The percentage of teachers of Group *B* and Group *C* schools who

had contact with foreign experts was negligible. It appeared that contact with extension service centers and attendance in workshops seemed to have played vital roles in bringing about curriculum change. With respect to foreign experts, not many teachers could attend workshops conducted by foreign experts since the workshops were conducted usually in big cities. Also, foreign experts did not find it possible to visit the rural areas.

The contact with extension service centers proved to be helpful in planning, executing, and evaluating projects, and in securing audio-visual aids and pedagogical literature, and in getting the teachers acquainted with the innovations made in other schools. The workshop experience was found to be helpful in getting themselves acquainted with new methods of teaching and evaluation, in exchanging views and in broadening their outlook. The contact with foreign experts was found to be helpful in gaining insight into the concept of the subject and in getting themselves acquainted with new trends in educational theory and practice.

An important observation was made by a principal of a Group A school on the role of foreign experts in bringing about educational change. He stated: "Our teachers, brought up largely in an authoritarian system, find it difficult to develop effective rapport with the foreign experts primarily oriented to a democratic and do-it-yourself system. In some cases, the foreign language creates a barrier between the teachers and the foreign experts."

From the findings, it seems fair to conclude that the facilities for professional growth may in fact be an important condition associated with the development of social studies curriculum. Foreign experts did not seem to have played a significant role in bringing about curriculum change.

Educational leadership of headmasters. — Eighty per cent of the headmasters of Group A schools were reported as having been actively involved in providing educational leadership. In comparison, about fifty-five per cent of the headmasters of

Group *B* and Group *C* schools were reported as having been actively involved in providing educational leadership.

Headmasters had demonstrated their leadership in supporting teachers when inspectors were critical of changes, by initiating change, and organizing workshops for the school faculty. Progressive attitudes, imagination, and boldness were considered important traits of headmasters' leadership in bringing about curriculum change. In general, this kind of leadership was demonstrated more by headmasters of Group *A* schools than by headmasters of Group *B* schools.

In general, in Group *A* schools there seemed to be more of a participating and collaborating type of relationship between teachers and headmasters than in Group *B* schools. This kind of leadership seemed to have played a more significant role than either authoritarian or an over-permissive type of leadership.

The burden of routine work, traditional authoritarian attitudes, lack of interests in a particular subject and the lack of experience in curriculum planning were among some of the reasons restricting educational leadership of headmasters.

From the findings, it seems reasonable to conclude that educational leadership displayed by the headmaster may have played a significant role in bringing about curriculum change in the social studies.

Influence of the external public examination.—A great majority of all types of schools seemed to consider the external public examination as a major factor in restricting curriculum change. The experts regarded the external public examination as a great restricting force in curriculum change.

During interviews, the investigator learned that in a great majority of Group *A* schools the teachers could not do much experimentation in grade XI, as they had to prepare the students for the external examination in the final grade. They also maintained that they found it difficult to introduce any substantial change in grade X because the school administrators in many cases insisted on starting to prepare the students for the external

public examination in grade X. An expert made a pertinent observation on the restricting influence of the external public examination in the following words: "This has exercised a very bad influence on our education. It has killed the initiative of the teacher. It has set up a very wrong standard of evaluating a school or a teacher." According to the experts, reforms in the external public examination might bring about change in various aspects of the curriculum.

Extent to which teachers were satisfied with their existing social studies programs. A great majority of all types of schools were dissatisfied with their existing social studies programs. Group A schools where some change had been introduced in the social studies curriculum were relatively less satisfied with the existing programs. However, in all types of schools the necessity for revising the curriculum to suit local needs was felt. Repetition of content in various grade levels, lack of coordination of the various subjects, and the domination of the Secondary School Certificate Examination were some of the limitations of the existing social studies curriculum.

With a view of identifying the extent to which different conditions were associated with changes in the social studies programs of Group A schools, the investigator made a study of interrelationships of different conditions. The number of Group A schools where various conditions associated with change were present have been reported in Table 2.

It appears from Table 2 that conditions 1, 6 and 7, namely, freedom to develop social studies programs locally, teachers' contact with regional extension service centers, and the educational leadership displayed by headmasters, were strikingly present in Group A schools. Only 10 Group A schools had access to teachers' contact with foreign experts.

Further examination of Table 2 reveals that material aid provided to schools, and facilities given to teachers to participate in workshops, were less strikingly present than conditions 1, 6, and 7. However, more Group A schools had access to

conditions 2 and 4 than condition 3, namely, technical aid provided to schools.

It could be concluded that out of the seven facilitating conditions, 1, 6 and 7 were more strikingly present in Group A schools than conditions 2 and 4.

Condition 3 was less strikingly present than conditions 2 and 4, and condition 5 was the least strikingly present in Group A schools.

TABLE 2

Number of Group A schools where various conditions associated with change in the Social Studies Programs were present*

<i>Serial No.</i>	<i>Facilitating conditions</i>	<i>No. of schools where the condition existed</i>	<i>No. of schools where the condition did not exist</i>	<i>No Response</i>
1.	Local autonomy	31	5	0
2.	Material aid	22	13	1
3.	Technical aid	17	17	2
4.	Teachers' workshops	23	13	0
5.	Foreign experts	10	25	1
6.	Extension service centers	27	8	1
7.	Headmaster's leadership	29	6	1

*The following is the explanation of the code words designating facilitating conditions :

1. Local autonomy—Freedom to develop social studies programs locally.
2. Material aid—Material aid provided to schools.
3. Technical aid—Technical aid provided to schools.
4. Teachers' workshops—Facilities given to teachers to participate in workshops.
5. Foreign experts—Teachers' contact with foreign experts.
6. Extension service centers—Teachers' contact with regional extension service centers.
7. Headmaster's leadership—Educational leadership demonstrated by headmasters.

Among the conditions described in the foregoing paragraphs, the investigator was interested in identifying the conditions which have been most crucial in bringing about change in the social studies curriculum of the selected schools. In order to realize this purpose six "maximum change" schools and six

"minimum change" schools were identified from the thirtysix Group A schools with the help of two Indian teachers. Those schools were to be considered "maximum change" schools if they had made change in three or more than three components of the social studies curriculum. Those schools were to be considered "minimum change" schools if they had made change in two or less than two components of the social studies curriculum. While selecting the "minimum change" schools to compare with the "maximum change" schools, variables such as type of schools, the location of schools, the school population, and the socio-economic class levels of schools were kept in view:

It was found that more "maximum change" schools felt free to develop social studies programs locally than the "minimum change" schools and more "maximum change" schools made use of the freedom in making innovations in various grades or combinations of grades than the "minimum change" schools. It was also found that the "maximum change" schools got a considerably larger amount of material and technical aid than the "minimum change" schools. The "maximum change" schools got relatively more material and technical aid especially in the forms of special grants, audio-visual appliances, project planning, conducting workshops, and evaluating projects.

In the "maximum change" schools, the headmasters demonstrated educational leadership to a considerably larger extent than in the "minimum change" schools. In the "maximum change" schools, the headmasters demonstrated the educational leadership especially in initiating change, organizing workshops, and in participating in workshops.

The "maximum change" schools got facilities for professional growth to a little larger extent than the "minimum change" schools especially in the forms of attendance in workshops and contact with regional extension service centers. However, the factor of facilities for professional growth does not seem to be as important as the other foregoing factors.

Implications

A few broad implications can be derived from the present study. The implications are based on the findings of schools' responses, interviews, and experts' opinions.

The study indicates that more innovations were made primarily by the "project schools". It follows, therefore, that more schools should be encouraged to undertake projects. The schools which undertook projects in one grade should be encouraged to carry on projects in other grades. Such "project schools" could provide guidance and encouragement to their sister institutions. The schools undertook projects as individual schools or as a group. Considering the shortage of resource personnel, it seems reasonable to suggest that schools should be more encouraged to take projects as a group. Another advantage in undertaking projects by schools as a group would be in sharing common instructional materials prepared by the schools and the extension service centers engaged in the projects.

In order to facilitate educational change, schools would have to be given more freedom to evolve their social studies programs locally to suit their local needs. The factor of freedom to develop social studies programs locally seems to have played a very important role in bringing about curriculum change. However, along with freedom, material aid in the form of special grants and instructional materials and technical aid in the form of assistance given in planning and evaluating projects and conducting workshops will have to be given to schools.

It is extremely difficult to provide various kinds of facilities to all the schools at the same time. The government and other agencies of change have to be selective. Priority may be given to those schools where headmasters demonstrate educational leadership by initiating change, organizing workshops, and participating in workshops. The study indicates that participating and collaborating type of leadership of headmasters would yield better results than the authoritarian type of leadership.

Shortage of reference books written in the mother tongue was felt both for teachers as well as students. There seems to

be a great scope and need for writing such books. Shortage of special tools such as attitude tests and achievement tests designed to assess critical thinking was felt by most of the schools. There seems to be a great scope and need for preparing such tools. The Central Unit of evaluation consisting of trained evaluation officers can provide technical assistance in meeting this need.

Regarding agencies of educational change, teachers as well as experts pinned their hopes on the regional extension service centers. These centers demonstrated their usefulness by providing material and technical assistance and serving as connecting links between teachers colleges and high schools. Teachers' demands for more centers have been escalating. The centers have served as a nucleus for initiating and promoting change. They need, however, to be developed more extensively. The All-India Council for Secondary Education (now known as the Directorate of Extension Programmes for Secondary Education) seems to have influenced curriculum change by providing material aid in the form of special grants and also by providing facilities for in-service education in the form of workshops and seminars. More efforts should be made by this agency by providing more material and technical assistance. Regarding technical assistance, a special attention needs to be paid to the schools situated in rural areas. As most of the workshops and seminars were arranged in cities, these schools did not get enough opportunities to benefit from such facilities.

Educational leadership displayed by headmasters seemed to be an important factor facilitating curriculum change. Wherever possible, headmasters should try to relieve themselves of the clerical type of routine work and should devote more time in providing educational leadership to their teachers. They can provide such leadership especially by initiating change, by arranging workshops for the school faculty, by participating in workshops arranged by other agencies, and by supporting their teachers when inspectors are critical of changes.

Agencies such as teachers colleges, educational inspectors, and foreign experts did not seem to have played a significant role in bringing about educational change. Teachers colleges, as one expert suggested, must develop three wings, namely, the educational wing, the research wing, and the extension wing. All these wings should work in complete co-ordination with each other and thus teachers colleges must assume their role as a vanguard of progress. Educational inspectors need to be oriented to progressive trends and practices. Foreign experts did not have time enough to serve the needs of schools. These agencies could be more useful if a systematic study investigating the strengths and weaknesses of these agencies were made. A research of this kind seems to be essential.

The external public examination was reported as a factor restricting curriculum change. This time-honored institution cannot be done away within a short time. It seems to the investigator that such an influential institution can be profitably used by making desirable reforms. Internal marking by schools should be considered in deciding student marks in the final examination. Questions to assess critical thinking and concepts and principles of social studies should find more place in the examination papers.

A few suggestions can be made for further research. An important investigation can be made regarding the relationship between various agencies of educational change. In such an investigation attention may be focussed on the nature and extent of co-ordination among these agencies. A useful research can be made regarding the role of foreign experts in bringing about educational change. It seems necessary to know the strengths and weaknesses of the role of this new agency of change in newly developing countries. A research of great importance can be made with respect to the potentialities of the "project schools" in bringing about educational change. In a country such as India where there is a limited amount of competent resource personnel, the "project schools" can serve as resource units. It seems important to study the role of the "project schools" with this purpose in mind.

This study did not investigate whether projects undertaken in the social studies in high schools had any significant influence on the social studies programs in middle schools (grades V, VI and VII). Such a study can provide further insight into the problem of educational change considered in the present study. An investigation of great usefulness can be undertaken to study the special problems of schools located in rural areas. India is primarily made of villages and it seems necessary to study the special needs and difficulties of village schools in bringing about educational change. Another research investigating the influence of variables such as type of schools, locations of schools, size of schools and socio-economic class levels of school population on educational change may also be very useful.

THE STUDY OF GROWTH PATTERN AMONG THE CHILDREN UNDER FIVE YEARS OF AGE IN CAMBAY

DR. HARKANT D. BADAMI

Department of Psychology

*University School of Psychology, Education and Philosophy
Gujarat University, Ahmedabad-9*

Introduction

Child study is one of the important areas of research. We can dispute regarding the formative period of life, but there is little doubt that the first five years of a child's life are of profound significance for future development and growth. They point the direction in which the subsequent development will take place. Often we find quite a number of people baffled by children's behaviour. If we develop a better understanding of human growth and development, we could help ourselves in building up a society, which will be a good place for its members to live in. A proper understanding of child development helps us in gaining insight into problems of education and society at large. Before we design any worthwhile child guidance program, it is necessary to study child's growth and development in his specific environment.

In view of all these, a modest attempt was made by the author to study the growth pattern among the children in Cambay.

The problem

In the present paper the author aims at pointing out the normal growth pattern of children under five years of age in Cambay. Specifically speaking, the author has sought to answer inquiries regarding the age of creeping, sitting, teething, walking and speaking in weeks.

The Study of Growth Pattern Among.....

Definition of crucial terms

- (1) Age of creeping : When the child lies on the chest and stomach and keeps his head stiff with the help of palms.
- (2) Age of sitting : When the child sits alone and turns around for a while.
- (3) Age of teething : Appearance of the first set of teeth—about three or four.
- (4) Age of walking : When the child starts walking without the help of other for a little distance.
- (5) Age of speaking : When the child starts speaking two or three worded sentences.

PROCEDURE

Sample

Two hundred children under five years of age were selected from the pre-primary institutions in Cambay. Out of three such institutions only two institutions took interest in the project and made their records and staff available to the author. Random sampling was not possible because of the specific nature of the data required. Under the circumstances, an incidental sample was selected.

Data

For the purpose of collection of data an information sheet was prepared. Some of the information was treated as background data such as sex; religion, caste, etc., and some of the information was treated as having a direct bearing on the problem. Each item concerning the problem was personally explained to the teachers. In addition to this, they were provided with an explanatory note for their ready reference. The teachers collected all the information from the parents either during their home visits or parents' visits to the institution.

Age of creeping in weeks

<i>Class Interval</i>	<i>Frequency</i>
47-50	7
43-46	10
39-42	13
35-38	15
31-34	29
27-30	41
23-26	30
19-22	28
15-18	9
Total.. 182	

Table-1

$$\bar{X} = 29.82$$

$$SD = 8.08$$

Age of sitting in weeks

<i>Class Interval</i>	<i>Frequency</i>
55-58	4
51-54	8
47-50	12
43-46	36
39-42	60
35-38	34
31-34	17
27-30	15
23-26	10
19-22	4
Total.. 200	

Table-2

$$X = 39.06$$

$$SD = 7.40$$

Age of teething in weeks

Class Interval	Frequency
63-68	10
57-62	11
51-56	28
45-50	39
39-44	58
33-38	30
27-32	16
21-26	8
Total.. 200	

Table-3

$$\bar{X} = 43.96$$

$$SD = 10.02$$

Age of walking in weeks

Class Interval	Frequency
91-96	7
85-90	8
79-84	8
73-78	15
67-72	35
61-66	50
55-60	32
49-54	20
43-48	8
37-42	7
31-46	5
Total.. 192	

Table-4

$$\bar{X} = 64.22$$

$$SD = 11.58$$

Age of speaking, in weeks

<i>Class Interval</i>	<i>Frequency</i>
89-96	7
81-88	19
73-80	28
65-72	49
57-64	37
49-56	26
41-48	14
33-40	10
Total.. 190	

Table-5

$$\bar{X} = 64.98$$

$$SD = 13.68$$

Statistical Analysis

After collection of the required data, background information was tabulated and necessary statistical analysis of the data (other than the background data) was made.

The means, standard deviations, standard errors of the means, and confidence interval for the true means at .05 levels of significance were calculated.

Results

<i>Sr. No.</i>	<i>Mean</i>	<i>SD</i>	<i>SE</i>	<i>TM</i> \bar{X}	<i>Level of</i> <i>significance</i>
1. Age of creeping in weeks	29.82	08.08	.60 ±	1.18	.05
2. Age of sitting in weeks	39.06	07.40	.52 ±	1.02	.05
3. Age of teething in weeks	43.96	10.02	.69 ±	1.35	.05
4. Age of walking in weeks	64.22	11.58	.83 ±	1.63	.05
5. Age of speaking in weeks	64.98	13.68	.99 ±	1.93	.05

Discussion

(1) The mean age of creeping is 29.82 weeks and the expected mean is supposed to lie some where between 28.64 and 31.00 at .05 level of confidence. The variation in the attainment of age of creeping as measured in terms of standard deviation is 8.08.

(2) The average age of sitting is 39.06 and the confidence interval for the true mean is 38.04-40.08 at .05 level of significance. The variation in the age of sitting as measured in terms of standard deviation is 7.40.

(3) The mean age of teething is 43.96 weeks and the expected mean is supposed to be some where between 42.61 and 45.31 at .05 level of confidence. The standard deviation is 10.02.

(4) The mean age of walking is 64.22 and the true mean is supposed to be some where between 62.59 and 65.85 at .05 level of confidence. The variation in the attainment of age of walking as measured in terms of standard deviation is 11.58.

(5) The average age of speaking is 64.98 and the confidence interval is 63.05-66.91. The standard deviation is 13.68.

The highest variability is found in the reported age of speaking and the lowest in sitting.

The results of the present paper are found to vary with the results reported by other investigators. The results of this kind of study are not comparable with the results of other similar studies, because of the variations found in the subjects, definitions, methods of study and interpretations.

Implications

- (1) The results of this paper will help teachers of Nursery and Kindergarten schools and especially the parents for studying the growth of their children.
- (2) The results suggest that there are individual differences in child growth and development, and it is not desirable to

compare one child with another in the same family or neighbourhood.

- (3) The author is of the opinion that the conclusions drawn in this paper need to be tested by extensive and intensive research at different socio-cultural levels.

Summary

The purpose of this paper was to point out some kind of normal growth pattern of children under five years of age in Cambay. Two hundred children from two pre-primary institutions were selected for the study. Data were collected from the parents with the help of the teachers. Necessary tabulations and statistical analysis were done. The mean age of creeping, sitting, teething, walking, and speaking in weeks was found 29.82, 39.06, 43.96, 64.22 and 64.98 respectively. Variations are found among the reports of similar studies made by other investigators. This is due to the variations found in the subjects, definitions, methods of study and interpretations. The findings of this paper will help the parents in studying the growth of their children and will initiate other research in this area.

Bibliography

- (1) Gesell, Arnold, *How A Baby Grows*. New York : Harper and Brothers, 1945.
- (2) Hurlock, Elizabeth, *Developmental Psychology*. New York : McGraw Hill Book Company, 1959.
- (3) Jersild Arthur, T., *Child Psychology*. London : Staples Press, 1960.
- (4) Skinner and Harriman, *Child Psychology*. New York : Macmillan Company, 1960.
- (5) Stang, Ruth, *An Introduction to Child Study*. New York : Macmillan Company, 1960.

NON-AQUEOUS TITRIMETRY

A. M. TRIVEDI,
K. P. SONI* and I. M. BHATT
Chemistry Department
University School of Sciences
Gujarat University, Ahmedabad-9

Non-aqueous titrimetry is the result of the revolutionary changes in the concept of acids and bases. The theories of Arrhenius and Germann¹ were further developed by Brönsted², who considered acid as any compound or an ion that can give up a proton and a base as any compound or an ion that can accept a proton. G. N. Lewis³ considered an acid as an electron pair acceptor and a base as an electron pair donor.

For non-aqueous titrimetry, solvents may be divided into :

(a) Ionisable solvents.—These are again subdivided into protogenic and amphiprotic solvents. Sulphuric acid is a typical protogenic solvent, while alcohol, acetic acid and water are the examples of amphiprotic solvents.

(b) The second class of the solvents are non-ionisable solvents which may react with an acid solute,



These solvents are often referred to as protophilic solvents.

(c) The last class of the solvents is the inert solvents which are neutral, chemically inert and possess low dielectric constants. These are called aprotic solvents. They are often added to ionisable solvents to depress the solvolysis of the neutralization products and to sharpen the end points.

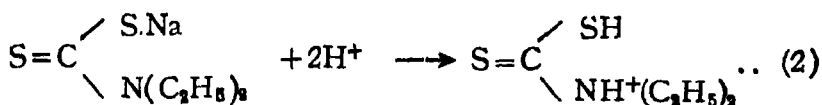
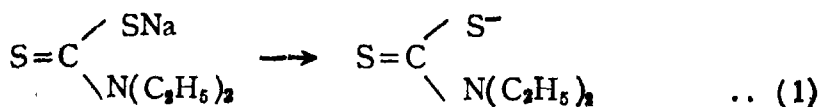
Non-aqueous titration may be performed with the same ease as normal acid-base titrations in aqueous solutions. The end point may be followed either potentiometrically or visually

*Chemistry Department, M. G. Science Institute, Ahmedabad-9.

using indicators. Such titrations have been studied in the last fifty years; although the bulk of the analytical papers date after 1943^{6,7}.

Below is given an account of the titrations of sodium diethyldithiocarbamate in non-aqueous solvents. The analytical methods^{6,7} available for the estimation of diethyldithiocarbamate are tedious and time consuming.

It was decided to attempt methods based upon non-aqueous titrimetry. Sodium diethyldithiocarbamate is a salt of a monobasic acid, in aqueous solutions; but it behaves as a dibasic acid in presence of excess of an acid.



The negative logarithm of the two dissociation constants¹⁴ were found to be fairly close to each other ($\text{p}K_{D1} = 7.8 \pm 0.1$ and $\text{p}K_{D2} = 8.0 \pm 0.1$). It was decided to investigate whether two 'jumps' can be distinguished more clearly by titration in non-aqueous solvents⁸.

Experimental

A known quantity (0.100 g.) of sodium diethyldithiocarbamate (abbreviated as NaDDTC) of B.D.H., A.R. quality was dissolved in different organic solvents or in their mixtures, and titrated against perchloric acid prepared in glacial acetic acid or dioxan. The chemicals used were either of B.D.H., A.R. or of Reagent Grade. Dioxan used was of B.D.H., A.R. quality. It was further purified by distilling it, after adding two grams of sodium hydroxide per 250 g. of dioxan. All other solvents were distilled before use.

Perchloric acid in dioxan or acetic acid was standardized by titrating it against a weighed quantity of anhydrous sodium

carbonate, dissolved in glacial acetic acid. The end point of the reaction was detected potentiometrically. Two instruments were used.

- (1) Leeds and northrup pH meter (catalogue no. 7666) equipped with glass and fibrous type calomel electrodes.
- (2) Beckman pH meter model H-2 (serial no. 93336) having similar type of electrodes.

Titration curves were carried out at temperature $30^\circ \pm 2^\circ$.

Results are depicted graphically in figures 1 to 8.

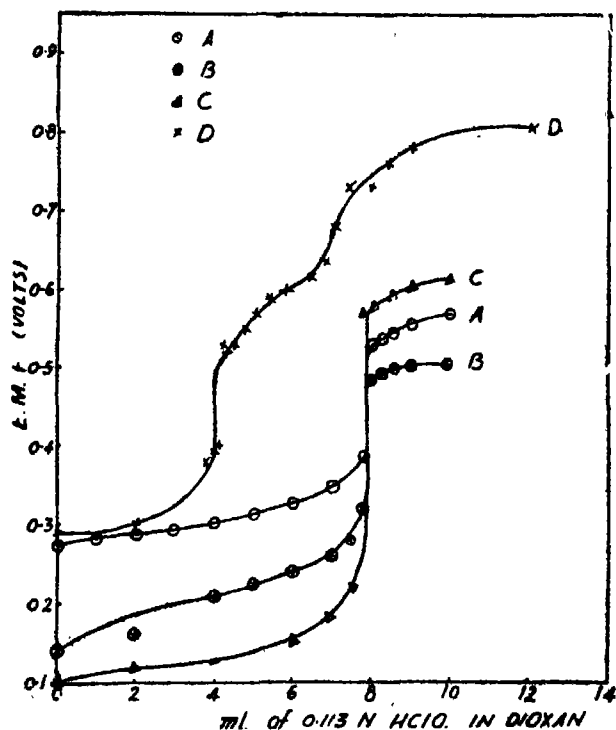


Fig. 1

Titration of NaDDTC in Non-aqueous Solvents

- (A) 0.1 g. NaDDTC + 55 ml. CH_3COOH
- (B) 0.1 g. NaDDTC + 5 ml. CH_3COOH + 50 ml. CHCl_3
- (C) 0.1 g. NaDDTC + 5 ml. CH_3COOH + 50 ml. dioxan
- (D) 0.1 g. NaDDTC + 50 ml. $(\text{CH}_3\text{CO})_2\text{O}$.

Normality of HClO_4 in dioxan : 0.113 N.

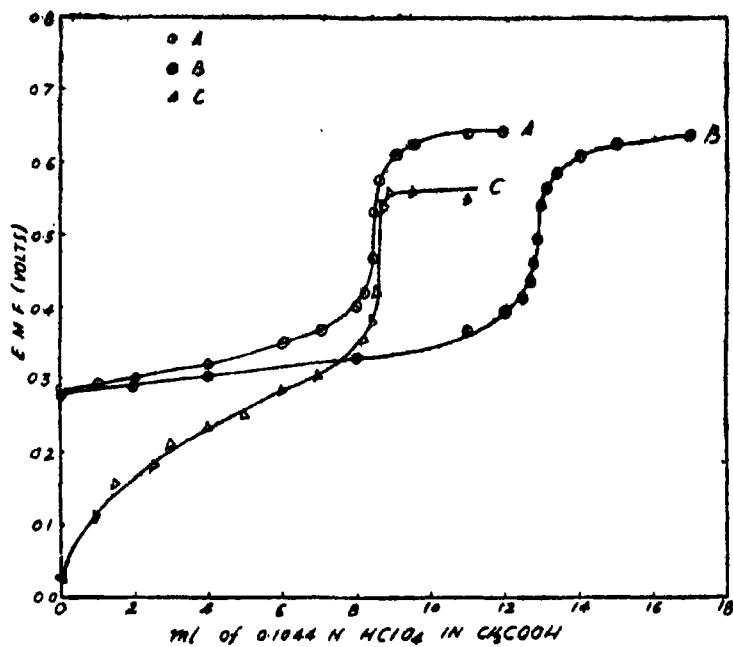


Fig. 3

Titration of NaDDTC in Non-aqueous Solvents

(A) 0.1 g. NaDDTC + 25 ml. CH₃COOH

(B) 0.15 g. NaDDTC + 25 ml. CH₃COOH.

(C) 0.1 g. NaDDTC + 5 ml. CH₃COOH + 75 ml. CHCl₃.

Normality of HClO₄ in CH₃COOH : 0.1044 N.

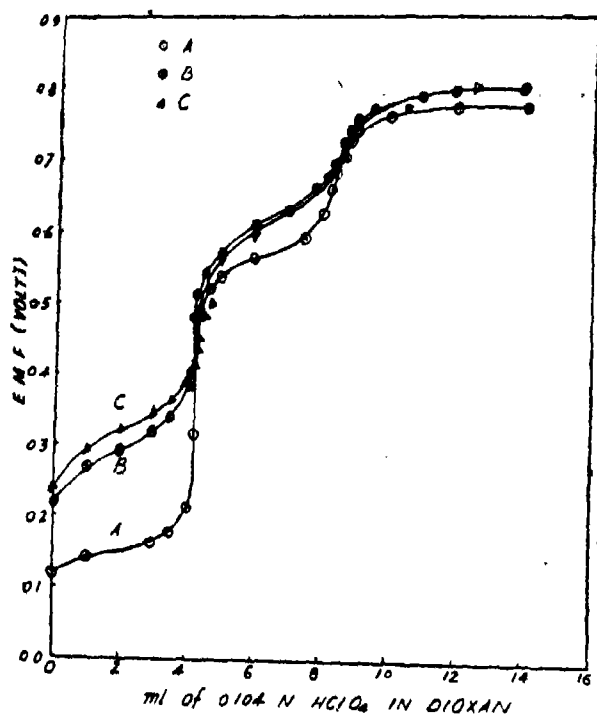


Fig. 4

Titration of NaDDTC in Non-aqueous Solvents

- (A) 0.1 g. NaDDTC + 0.5 ml. CH_3COOH + 5 ml. $(\text{CH}_3\text{CO})_2\text{O}$
+ 100 ml. CHCl_3
(B) 0.1 g. NaDDTC + 5 ml. CH_3COOH + 10 ml. $(\text{CH}_3\text{CO})_2\text{O}$
+ 50 ml. CHCl_3
(C) 0.1 g. NaDDTC + 10 ml. CH_3COOH + 10 ml. $(\text{CH}_3\text{CO})_2\text{O}$
+ 100 ml. CHCl_3
Normality of HClO_4 in dioxan: 0.104 N.

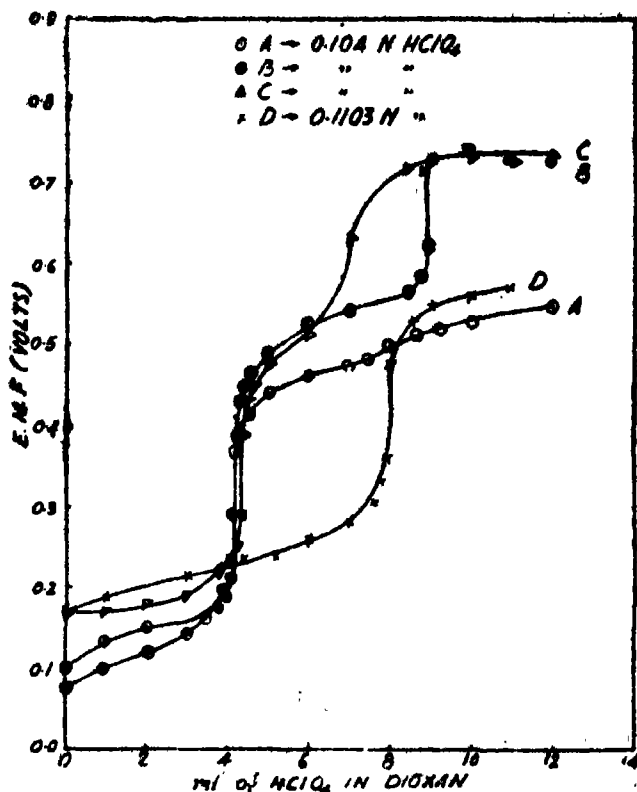


Fig. 3

Titration of NaDDTC in Non-aqueous Solvents

- *(A) 0.1 g. NaDDTC + 5 ml. $(\text{CH}_3\text{CO})_2\text{O}$ + 20 ml. CH_3CN
+ 50 ml. CHCl_3
(B) 0.1 g. NaDDTC + 5 ml. $(\text{CH}_3\text{CO})_2\text{O}$ + 20 ml. CH_3CN
+ 50 ml. CHCl_3
(C) 0.1 g. NaDDTC + 10 ml. $(\text{CH}_3\text{CO})_2\text{O}$ + 20 ml. CH_3CN
(D) 0.1 g. NaDDTC + 5 ml. CH_3COOH + 20 ml. CH_3CN
+ 50 ml. CHCl_3 .

Normality of HClO_4 in dioxan: 0.104 N (A, B & C): 0.1103 N (D).

* low temperature. $15^\circ \pm 1^\circ \text{C}$.

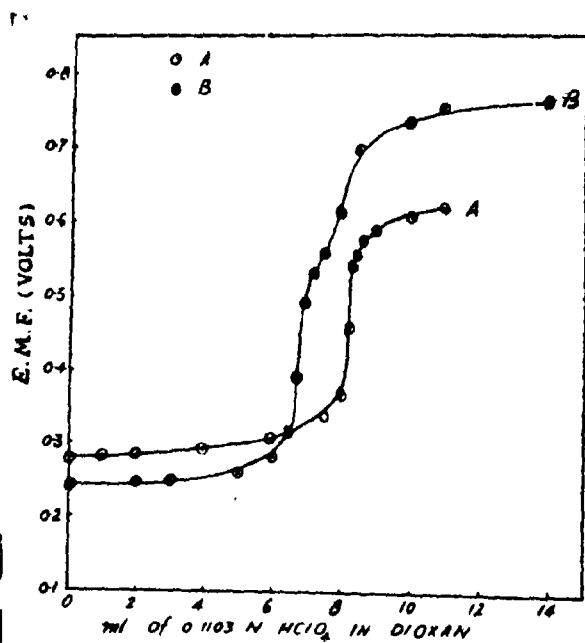


Fig. 6

Titration of Diethylamine in Non-aqueous Solvents

(A) 0.090 N amine in 10 ml. CH_3COOH + 30 ml. CH_3COOH

(B) 0.090 N amine in 10 ml. CH_3COOH + 10 ml. $(\text{CH}_3\text{CO})_2\text{O}$

Normality of HClO_4 in dioxan : 0.1103 N.

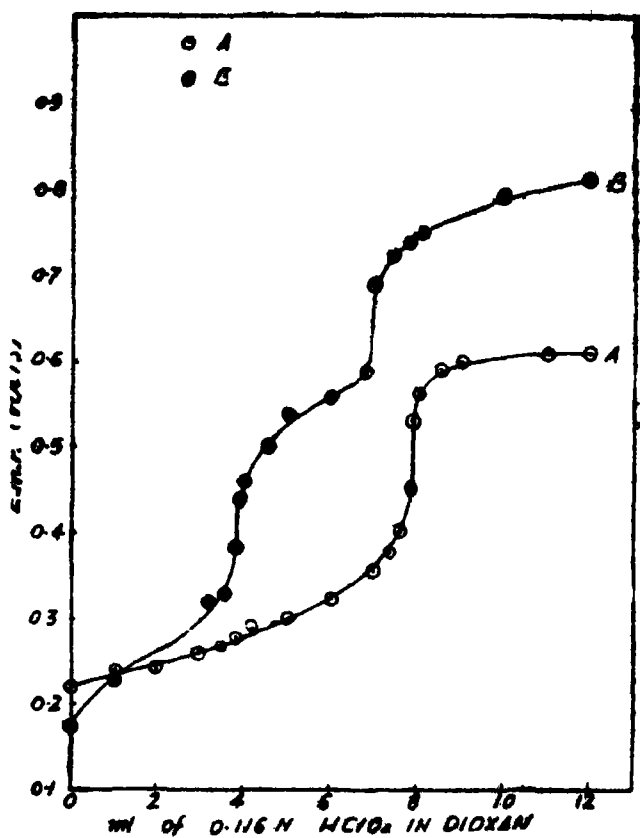


Fig. 7

Titration of NaDDTC in Non-aqueous Solvents

(A) 0.1 g. NaDDTC + 5 ml. CH_3COOH + 50 ml. $\text{C}_6\text{H}_5\text{NO}_2$

(B) 0.1 g. NaDDTC + 5 ml. $(\text{CH}_3\text{CO})_2\text{O}$ + 50 ml. $\text{C}_6\text{H}_5\text{NO}_2$

Normality of HClO_4 in dioxan : 0.116 N.

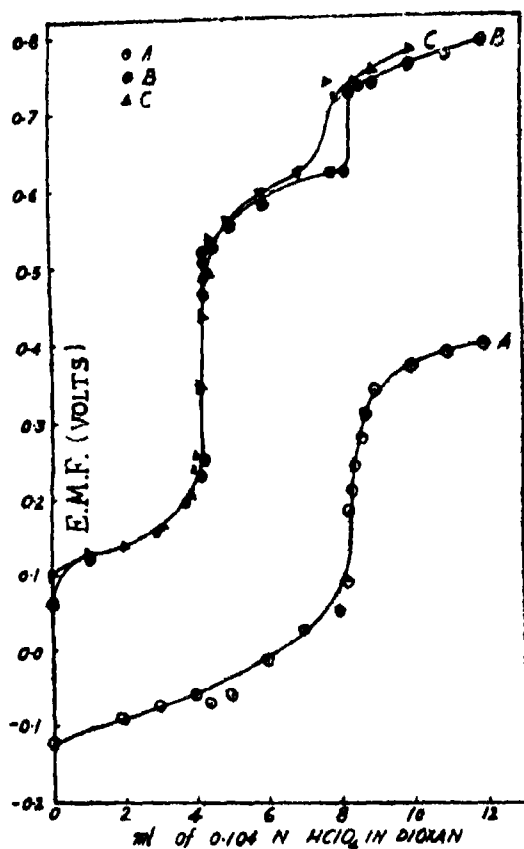


Fig. 3

Titration of NaDDTC in Non-aqueous Solvents

(A) 0.1 g. NaDDTC + 50 ml. C_2H_5OH

(B) 0.1 g. NaDDTC + 5 ml. $(CH_3CO)_2O$ + 100 ml. $CHCl_3$ + *20 ml. dioxan

(C) 0.1 g. NaDDTC + 4 ml. $(CH_3CO)_2O$ + 50 ml. $CHCl_3$ + *40 ml. dioxan.

Normality of $HClO_4$ in dioxan : 0.104 N.

*Dioxan added after first neutralisation point.

Discussion

It will be more convenient to narrate briefly the points made out in figures and then to correlate the data.

Fig. 1 :

In this case, it is shown that with acetic acid as a solvent curve A), the jump is obtained, when both the groups of

NaDDTC are neutralized, i.e., NaDDTC consumes two equivalents of titrant acid. The jump becomes sharper on addition of chloroform, an aprotic solvent (curve *B*). The use of acetic anhydride as a solvent gives the first jump only (utilization of one equivalent of the titrant acid). The second jump is not marked and is also shifted from the theoretical end point (curve *D*). Dioxan as a solvent (as in acetic acid as a solvent) gives the second jump clearly (curve *C*). Comparing curves *A*, *B* and *C*, it appears that the sharpness of the jump increases as the dielectric constant of the medium decreases (dielectric constants of dioxan, chloroform and acetic acid are 2.2, 4.6 and 6.1 respectively).

Fig. 2 :

The addition of chloroform to acetic anhydride sharpens the first jump (compare curve *D*, fig. 1); but the second jump is still shifted and is not sharp (curve *A*). An attempt was made to obtain the second jump, at the expected value, by the addition of acetic acid. It was noted previously that (fig. 1, curve *A*), acetic acid alone does give the second jump, in a clear manner at the expected point. However, the curves *B* and *C* show that the subsequent addition of acetic acid, even in large quantities, does not help the situation, as the second jump remains indistinct.

Fig. 3 :

Although, dioxan appears to be more suitable solvent for preparing a standard solution of perchloric acid, acetic acid as a solvent for perchloric acid also gives fairly concordant results for the second group (see curve *A*). The curve *B* shows that the second jump obtained is independent of the concentration of the solute (in this case concentration of the solute is 1.5 times that of in curve *A*); while the curve *C* shows that the jump becomes sharper in presence of chloroform.

Fig. 4 :

Attempts were made to see whether, both the jumps are obtained, when mixtures of acetic acid and acetic anhydride

are employed. Chloroform was added in all the cases to sharpen the end point. The proportion of acetic acid to acetic anhydride is varied in all the three cases. In the presence of acetic anhydride all the curves show the first jump. As before, the second jump becomes indistinct in the presence of acetic anhydride (see curves, fig. 2). The end point is sharpest in presence of minimum quantity of acetic anhydride and maximum quantity of chloroform.

Fig. 5 :

When acetonitrile is used as a solvent, the first jump is not available; but the second jump is obtained in a fairly sharp manner (curve *D*). Addition of acetic anhydride results in the shifting of the second jump (curves *B* and *C*) which becomes still more indistinct at low temperatures (curve *A*). The first jump is available in all the three curves *A*, *B* and *C*.

Fig. 6 :

When diethylamine (0.090 N) in acetic acid is titrated against perchloric acid in dioxan, the end point at neutralization is clearly obtained (curve *A*). Addition of acetic anhydride results in shifting of the end point (curve *B*). This shows that acetylation of the amine by acetic anhydride, may be responsible for shifting of the second jump, in the above cases.

Fig. 7 :

Addition of nitrobenzene as a solvent, gives the second jump (curve *A*). As the substance was found insoluble in nitrobenzene, addition of acetic acid was necessary. In the curve *B*, the presence of acetic anhydride ensures the first jump; but the second jump is again shifted.

Fig. 8 :

Ethyl alcohol as a solvent gives the second jump only (curve *A*).

When NaDDTC, in a mixture of acetic anhydride and chloroform, is titrated, the first jump is clearly obtained. Attempts to obtain the second jump, by the subsequent addition of dioxan, were not successful (curves *B* and *C*).

General

From the above discussion it is evident that a clear jump is observed at the utilization of two equivalents of the titrant acid, when dioxan, acetonitrile, acetic acid, nitrobenzene or ethyl alcohol is used as a solvent. In agreement with our previous findings,⁹ this confirms that NaDDTC is a diacidic base. Mixture of solvents such as acetic acid and chloroform or acetic acid and dioxan gives sharper end points as compared to when acetic acid alone is used as a solvent. Again, the end point is sharper with acetic acid-dioxan mixture as compared to acetic acid-chloroform solvent (fig. 1, curves *C* and *B*). This may be attributed to the lower dielectric constant of the acetic acid-dioxan mixture. Pifer and Wollish¹⁰ noted that in titration of certain amine salts with perchloric acid, the end point was progressively sharpened as a greater proportion of dioxan was added to the acetic acid used. It is not possible to use dioxan alone as a solvent as unsteady potentials are obtained.¹¹ Chloroform being an aprotic solvent, tends to depress solvolysis, and its addition to acetic acid provides a sharper end point.

In the present work an attempt was made to differentiate the two basic groups of the substance. Fritz¹² found that acetonitrile was the best solvent to differentiate the amines having pK values near to each other. As NaDDTC was insoluble in this solvent, addition of acetic acid was necessary. The results obtained with this solvent, are shown in figure 5 (curve *D*). It is clear from the curve that only the second jump is obtained. Hence, acetonitrile was found unsuitable for differentiation of the two groups of NaDDTC. In titrating certain weak amines, water should be removed as much as possible by employing a solvent mixture, containing acetic anhydride.¹³ When this procedure is applied to the present case, it was found that the first jump at the utilization of one equivalent of the acid is clearly obtained (see fig. 1, curve *D*; fig. 2, curves *A*, *B* and *C*; fig 4, curves *A*, *B* and *C*, etc.). Hence, it is clear that when acetic anhydride is used alone as a solvent or as one of the components of the solvent mixture, the first jump is clearly obtained.

The dielectric constants of acetic anhydride (20.7) is high as compared to the dielectric constants of the other solvents. It may be argued that the raising of the dielectric constant may be responsible for the first jump to be obtained. This is not so, as the titrations carried out with mixtures (of different solvents), having nearly the same dielectric constant as acetic anhydride, did not provide the first jump (see fig. 8, curve A). Acetic anhydride also removes water from the system, and this appears to be the most probable factor responsible for obtaining first jump.

The disadvantage of employing acetic anhydride as a solvent either singly or with other solvents, is that in its presence, the second jump either disappears or is shifted. This may be due to the increase in dielectric constant of the medium. Alternatively, acetic anhydride may react with the amine which may be formed from the original substance.

Hence, non-aqueous titrimetry appears to be more suitable for the estimation of alkali diethyldithiocarbamate. It was not possible to employ a solvent or a mixture of solvents which may give both the first and the second jumps clearly. In the presence of acetic anhydride the first jump is obtained clearly; while in the presence of many other solvents (but in the absence of acetic anhydride) the second jump is obtained clearly. Table 1 gives the calculated and the observed end points of the titrations of figure nos. 1 to 8.

TABLE 1

No.	Solvents	End point-				Reference figure
		Calculated	Observed			
		I	II	I	II	
1	2	3	4	5	6	7
1	CH ₃ COOH	3.93	7.85	—	7.90	I-A
2	CH ₃ COOH + CHCl ₃	3.93	7.85	—	7.90	I-B
3	CH ₃ COOH + Dioxan	3.93	7.85	—	7.90	I-C
4	(CH ₃ CO) ₂ O	3.93	7.85	4.00	—	I-D

1	2	3	4	5	6	7
5	$(\text{CH}_3\text{CO})_2\text{O} + \text{CHCl}_3$	3.83	7.65	3.80	—	II-A
6	$(\text{CH}_3\text{CO})_2\text{O} + \text{CHCl}_3$ + CH_3COOH	3.83	7.65	3.80	—	II-B
7	$(\text{CH}_3\text{CO})_2\text{O} + \text{CHCl}_3$ + CH_3COOH	3.83	7.65	3.90	—	II-C
8	CH_3COOH	4.25	8.50	—	8.40	III-A
9	CH_3COOH	6.35	12.70	—	12.80	III-B
10	$\text{CH}_3\text{COOH} + \text{CHCl}_3$	4.25	8.50	—	8.50	III-C
11	$\text{CH}_3\text{COOH} + (\text{CH}_3\text{CO})_2\text{O}$ + CHCl_3	4.27	8.53	4.30	—	IV-A
12	$\text{CH}_3\text{COOH} + (\text{CH}_3\text{CO})_2\text{O}$ + CHCl_3	4.27	8.53	4.20	—	IV-B
13	$\text{CH}_3\text{COOH} + (\text{CH}_3\text{CO})_2\text{O}$ + CHCl_3	4.27	8.53	4.30	—	IV-C
14	$(\text{CH}_3\text{CO})_2\text{O} + \text{CH}_3\text{CN}$ + CHCl_3	4.27	8.53	4.40	—	V-A
15	$(\text{CH}_3\text{CO})_2\text{O} + \text{CH}_3\text{CN}$ + CHCl_3	4.27	8.53	4.20	—	V-B
16	$(\text{CH}_3\text{CO})_2\text{O} + \text{CH}_3\text{CN}$	4.27	8.53	4.40	—	V-C
17	$\text{CH}_3\text{COOH} + \text{CH}_3\text{CN}$ + CHCl_3	4.02	8.04	—	8.00	V-D
18	CH_3COOH	4.08	8.16	—	8.20	VI-A
19	$\text{CH}_3\text{COOH} + (\text{CH}_3\text{CO})_2\text{O}$	4.08	8.16	—	6.80	VI-B
20	$\text{CH}_3\text{COOH} + \text{C}_6\text{H}_5\text{NO}_2$	3.83	7.65	—	7.80	VII-A
21	$(\text{CH}_3\text{CO})_2\text{O} + \text{C}_6\text{H}_5\text{NO}_2$	3.83	7.65	3.80	—	VII-B
22	$\text{C}_6\text{H}_5\text{OH}$	4.27	8.53	—	8.50	VIII-A
23	$(\text{CH}_3\text{CO})_2\text{O} + \text{CHCl}_3$ + Dioxan	4.27	8.53	4.20	—	VIII-B
24	$(\text{CH}_3\text{CO})_2\text{O} + \text{CHCl}_3$ + Dioxan	4.27	8.53	4.20	—	VIII-C

Thanks are due to University Grants Commission for purchase of equipment, thanks are also due to Gujarat University for purchase of chemicals and due to Ahmedabad Education Society for providing laboratory facilities.

References

1. Germann and Timpanny, J. Am. Chem. Soc., **47** (1925), 2275.
2. Brönsted, Ber., **61** (1928), 2049.
3. Luder and Zuffranti, "Electronic theory of acids and bases", John Wiley & Sons, 1946, p.44.
4. "Titration in non-aqueous solvents", by A. H. Beckett and E. H. Tinley, published by British Drug House Ltd., England.
5. "Technical news service", Sarabhai Merck Ltd., Baroda, India, Vol. I, Nos. 3, 4 and 6.
6. Lieber, Eugene and Whitmore, Ind. Eng. Chem. Anal Ed. **7** (1935), 127.
7. Linch, Anal. Chem. **23** (1951), 293.
8. Soni and Trivedi, J. Ind. Chem Soc., **38** (1961), 65.
9. Soni and Trivedi, J. Ind. Chem. Soc., **37** (1960), 349.
10. Pifer and Wollish, Anal. Chem., **24** (1952), 300.
11. Fritz, *ibid.*, **26** (1954), 1701.
12. Fritz, *ibid.*, **26** (1954), 407.
13. Fritz and Fulda, *ibid.*, **25** (1953), 1837.
14. Soni, Trivedi and Bhatt, J. Ind. Chem. Soc. **43** (1966) 85.

સામાન્ય સ્થાન-વિજ્ઞાન

(GENERAL TOPOLOGY)

હી. ન. રાવલ

ગણિત વિભાગ, વિજ્ઞાન વિદ્યાલયન
ગુજરાત યુનિવર્સિટી, અમદાવાદ-૬

અમ

આ. મ. વ. પારેખ

ગણિત વિભાગ, ગુજરાત કૉલેજ,
એલિસબ્રિજ, અમદાવાદ-૬

૧. રજૂઆત

‘વિદ્યા’ના પાછલા અંકોમાં અંતર અવકાશ વિશે ઠંઠક લખાયું છે. સ્થાન-વિજ્ઞાન (Topology)માં જેને અંતર સ્થાન વિજ્ઞાન (metric topology) કહી શકીએ તેમાં એ ઉપયોગી થઈ શકે. હવે સામાન્ય સ્થાન-વિજ્ઞાન વિષે પ્રાથમિક માહિતી અહીં આપવામાં આવે છે. સ્થાન-વિજ્ઞાનનું મહત્ત્વ આત્મારના ગણિતમાં ધણું છે; અને આપણામાંના ધણા તેને કઠિન વિષય પણ ગણતા હશે. છતાં આ સ્થાન-વિજ્ઞાનનો મૂળ ખ્યાલ માન્યતા છે એટલો મુશ્કેલ સમજવામાં નથી. સ્થાન-વિજ્ઞાનને કેટલીક વાર રચના દુકડાની ભૂમિતિ તરીકે ઓળખાવવામાં આવે છે. એટલે કે રચના દુકડાને તાણીને ખેંચી શકાય; તેને વાળી શકાય. આમ તાણવાથી અને વાળવાથી એ એક દુકડામાંથી પહેલી નજરે બહુ જ અલગ લાગતી કેટલીએ આકૃતિઓ બની શકે. માત્ર એ દુકડો તાણવાથી કે વાળવાથી તૂટી ન જાય તેટલું બંધન સ્વીકારવાનું રહે છે. હવે વાળવું અને/અથવા તાણવું પણ તોડવું નહિ એ ખાસ કરીને સતત રૂપાંતર કે સાતત્ય તરફ અંશુલિનિર્દેશ કરે છે. આમ વિચારીએ તો સહેજે કહી શકાય કે સતત રૂપાંતર વડે આકૃતિના જે ગુણધર્મો સચવાઈ રહેતા હોય એવા ગુણધર્મોનો અભ્યાસ આ સ્થાન-વિજ્ઞાનમાં પ્રધાનપણે આવે. આ વાત આપણે ગણિતની પરિભાષામાં વ્યવસ્થિત કરીને હવે જોઈએ. ભૌમિતિક આકૃતિઓ પહેલાં તો તેમાં આવતા બિંદુઓના સંઘ છે.

આમ ધારો કે આપણી પાસે એક સંઘ S છે. તેના સભ્યોને બિંદુઓ કહીશું. S સંઘમાંથી બિંદુઓ લઈને આપણે S ના ઉપસંઘો બનાવી શકીએ. ત્રણ બિંદુઓ ૧, ૨, ૩, લઈને તેનો સંઘ $S = \{ ૧, ૨, ૩ \}$ લઈએ તો S માંથી નીચે મુજબ આઠ ઉપસંઘો બનાવી શકાય.

ક (અન્ય સંઘ), $\{ ૧ \}$, $\{ ૨ \}$, $\{ ૩ \}$, $\{ ૧, ૨ \}$, $\{ ૨, ૩ \}$, $\{ ૧, ૩ \}$
 $\{ ૧, ૨, ૩ \}$

આમાંથી અમુક ઉપસંધો પસંદ કરીને આપણે ઉપસંધોનું કુટુંબ-ઉપસંધ-કુટુંબ બનાવી શકીએ, જેમ કે

(a) ϕ , $\{2,3\}$, $\{1,2\}$, $\{1,2,3\}$ ઉપસંધો લઈને મળતું ઉપસંધ-કુટુંબ

(b) ϕ , $\{1,2,3\}$ એ બે ઉપસંધો લઈને બનતું ઉપસંધ-કુટુંબ

(c) ϕ , $\{1\}$, $\{2,3\}$, $\{1,2,3\}$ એમ ત્રણ ઉપસંધો લઈને મળતું ઉપસંધ-કુટુંબ

(d) આઠેય ઉપસંધો લઈને બનતું ઉપસંધ-કુટુંબ.

આમાં,

(a) ϕ , $\{1,2,3\}$ એ બંને ઉપસંધો ઉપરના ચારેય ઉપસંધ-કુટુંબના સભ્યો છે.

(b) ઉપસંધ-કુટુંબના કોઈ પણ બે ઉપસંધોનો છેદસંધ પણ એ જ કુટુંબમાં આવતો હોય એવું પહેલા કુટુંબ (a)માં નથી બનતું. તેમાં $\{2,3\}$ અને $\{1,2\}$ ઉપસંધોનો છેદસંધ $\{2\}$ સભ્ય તરીકે નથી જ્યારે પાછલા ત્રણેય ઉપસંધ-કુટુંબો (b), (c), (d)માં તે કુટુંબના કોઈ પણ બે ઉપસંધોનો છેદસંધ એ જ કુટુંબનો સભ્ય છે.

અને છેલ્લે

(c) ઉપસંધ-કુટુંબના ગમે તેટલા સભ્યોનો યોગસંધ પણ એ કુટુંબનો સભ્ય હોય એવું તો ચારેય કુટુંબો (a), (b), (c), (d)માં જોઈ શકાય છે.

સંધ S ઉપર સ્થાન (Topology) સ્થાપિત કરવા માટે ઉપર (a), (b), અને (c)માં બતાવેલા ગુણધર્મો ઉપયોગી થાય છે.

સંધ S ના ઉપસંધોનું કુટુંબ F જે એવું હોય કે તેમાં

(a) ϕ , S બંને સભ્યો તરીકે આવતા હોય

(b) F ના કોઈ પણ બે સભ્યોનો છેદસંધ પણ F નો સભ્ય હોય (આના ઉપરથી F ના મર્યાદિત સંખ્યાના સભ્યોનો છેદસંધ પણ F નો સભ્ય હોય), અને

(c) F ના ગમે તેટલા સભ્યોનો યોગસંધ પણ F નો સભ્ય હોય

તો

કુટુંબ F સંધ S ઉપર સ્થાન કે એમ આપણે કહીશું અને સંધ S તથા સ્થાન F ને સાથે લેતાં $[S; F]$ વ્યવસ્થાને સ્થાનાવકાશ (Topological space) અથવા માત્ર અવકાશ (space) તરીકે આપણે ઓળખીશું.

ઉપરના ઉદાહરણમાં (a) સિવાયનાં બીજાં બધાં કુટુંબો (b), (c), (d), સંધ S ઉપર સ્થાનો છે. આમ એક જ સંધ ઉપર અલગ અલગ સ્થાનો લઈ શકતાં હોવાથી એક જ સંધમાંથી અનેક સ્થાનાવકાશો રચી શકાય. જે પરિસ્થિતિમાં સંધ S ઉપર એક જ સ્થાન F ની વિચારણા કરવાની હોય તે પરિસ્થિતિમાં $[S; F]$ વ્યવસ્થામાં સ્થાન F નો નિર્દેશ ન કરીએ તોપણ તે સમજી શકાય અને તેથી આ પરિસ્થિતિમાં $[S; F]$ ને અવકાશ તરીકે નિર્દેશવા માટે પણ $[S]$ અથવા S સંકેતનો ઉપયોગ કરી શકાય.

૨. નિરંબર ઉપસંધ (open subset)

$[S; F]$ સ્થાનાવકાશ માટે F કુટુંબના પ્રત્યેક સભ્ય ઉપસંધને આપણે અવકાશના નિરંબર (open) ઉપસંધ તરીકે ઓળખીશું અને F નો સભ્ય ન હોય તેવા કોઈ પણ ઉપસંધને નિરંબર ઉપસંધ નહિ કહીએ.

અંતર અવકાશમાં નિરંબર સંધોના જે ગુણધર્મો સાબિત કરવામાં આવે છે એ જ ગુણધર્મોને આપણે સ્થાનની વ્યાખ્યામાં પૂર્વધારિત કરીને આગળ વધીએ છીએ એ તો દેખાઈ આવશે.

અંતર અવકાશમાં સામીખ્યોના યોગ સંધોનાં કુટુંબને સ્થાન તરીકે લઈ શકાય અને તેથી પ્રત્યેક અંતર અવકાશને સ્થાનાવકાશ પણ ગણી શકાય, પરંતુ “પ્રત્યેક સ્થાનાવકાશને અંતર અવકાશ ગણી શકાય” — એ વિધાન હંમેશાં સાચું નથી.

હવે સ્થાનાવકાશ S નો કોઈ પણ ઉપસંધ નિરંબર ઉપસંધ હોવા માટે જરૂરી અને પર્યાપ્ત પ્રતિબંધ નીચે મુજબ મેળવીએ :

પ્રમેય ૧

સ્થાનાવકાશ S માંનો ઉપસંધ A આ અવકાશનો નિરંબર ઉપસંધ હોય એ માટે જરૂરી અને પ્ર્યાપ્ત પ્રતિબંધ એ છે કે A ઉપસંધના પ્રત્યેક બિંદુ a માટે આપણને અવકાશનો નિરંબર ઉપસંધ એવો મળે કે જેમાં બિંદુ a આવેલું હોય અને જે A નો ઉપસંધ હોય.

સાબિતી

પ્રથમ તો ધારીએ કે A નિરંબર છે તો A ના પ્રત્યેક બિંદુ a માટે આ બિંદુનો સમાવેશ કરતો A નો ઉપસંધ A પોતે જ હોવાથી ઉપરનો પ્રતિબંધ જરૂરી છે એમ તો જણાઈ આવ્યું.

હવે A ના પ્રત્યેક બિંદુ a માટે એવો નિરંબર ઉપસંધ α_a અસ્તિત્વ ધરાવતો હોય કે જેથી બિંદુ a , α_a માં હોય અને α_a , A નો ઉપસંધ હોય તો આવા નિરંબર ઉપસંધો α_a નો યોગસંધ $U_{a \in A} \alpha_a$ લઈએ.

$A \subset U_{a \in A} \alpha_a$, એ તો દેખીતું જ છે ઉપરાંત પ્રત્યેક α_a , A નો ઉપસંધ હોવાથી

$U_{a \in A} \alpha_a$ પણ A નો ઉપસંધ થાય. આમ

$A \subset U_{a \in A} \alpha_a \subset A$ થવાથી

$A = U_{a \in A} \alpha_a$; પરંતુ પ્રત્યેક α_a નિરંબર હોવાથી $U_{a \in A} \alpha_a$ પણ નિરંબર થાય

અને તેથી A નિરંબર થાય. આમ પ્રતિબંધની પર્યાપ્તતા સિદ્ધ થઈ.

૩. વિયોગ-પૂર્વધારણાઓ (Separation axioms)

$[S; F]$ સ્થાનાવકાશમાં સ્થાન F માટે અન્ય કોઈ નિયંત્રણો ન હોય તો તેમાં બહુ ઓછું આગળ વધી શકાતું નથી; ઊદાહરણ આપણને અસંગત લાગે એવી સ્થાના પણ બની

આપ. દા.ત., વિભાગ ૧ માં આપેલા ઉદાહરણમાં કુટુંબ (c)ને સંધ $S = \{1, 2, 3\}$ ઉપરના સ્થાન તરીકે લઈએ તો તેમાં $\{1\}$ ઉપસંધ નિરંબર (અને સંવૃત) છે જ્યારે $\{2\}$ ઉપસંધ નિરંબર (કે સંવૃત) નથી જ્યારે અંતર અવકાશમાં અને સામાન્ય વિશ્લેષણમાં એક બિંદુ જ જેનો સભ્ય હોય (અથવા મર્યાદિત સંખ્યાનાં બિંદુઓ જેનાં સભ્યો હોય) તેવો કેઈ પણ ઉપસંધ સંવૃત હોવાનું આપણે નક્કીએ છીએ. આથી કરીને અવકાશને સ્થાનાંકિત કરનાર ઉપસંધ કુટુંબ પર થોડું નિયંત્રણ મૂકવાની જરૂરિયાત ઊભી થાય છે. આનું નિયંત્રણ વિયોગ પૂર્વધારણાઓ (Separation axioms) લઈને બતાવીશું.

વિયોગ-પૂર્વધારણા (૧)

અવકાશનાં કેઈ પણ બે બિંદુઓ માટે તેમાંના એક બિંદુને સમાવતો અને બીજાને નહીં સમાવતો નિરંબર ઉપસંધ મળી રહે છે.

દા.ત., ઉપરના $\{1, 2, 3\}$ સંધના ઉદાહરણમાં, ક, $\{1, 2, 3\}$ ઉપસંધોથી બનતાં ઉપસંધ-કુટુંબને સ્થાન કહીએ તો વિયોગ-પૂર્વધારણા (૧) સમ્પત્તી નથી. પરંતુ આદ્ય ઉપસંધોને સ્થાનનિર્દેશક ઉપસંધ-કુટુંબના સભ્યો લઈએ તો પૂર્વધારણા (૧) સમ્પત્તિ રહે છે.

વિયોગ-પૂર્વધારણા (૨)

અવકાશનાં કેઈ પણ બે બિંદુઓ a અને b માટે નિરંબર ઉપસંધો α_a, α_b એવા મળી રહે છે કે જેથી a, α_a માં આવે પણ α_b માં ન આવે, અને b, α_b માં આવે પણ α_a માં ન આવે, એટલે કે બેમાંથી પ્રત્યેક બિંદુને સમાવતો અને તદ્દતર બિંદુને નહીં સમાવતો ઉપસંધ મળી રહે છે. ઉદાહરણ તરીકે ધારો કે અવકાશ S , અનંત સભ્યોવાળું અવકાશ છે અને જેનો પૂરક સંધ મર્યાદિત સંખ્યાના સભ્યોવાળો હોય એવા પ્રત્યેક ઉપસંધને સ્થાનનિર્દેશક ઉપસંધ-કુટુંબ F ના સભ્ય તરીકે લઈએ તો આ અવકાશના કેઈ પણ બે સભ્યો a, b માટે,

$S - \{a\}$ અને $S - \{b\}$ ઉપસંધોના પૂરક સંધો $\{a\}, \{b\}$ અનુક્રમે હોવાથી $S - \{a\}, S - \{b\}$ નિરંબર છે અને $S - \{b\}$ માં a આવેલું છે અને b આવેલું નથી. તેમ જ $S - \{a\}$ માં b આવેલું છે અને a આવેલું નથી; આથી આવા અવકાશ માટે વિયોગ-પૂર્વધારણા (૨) સમ્પત્તિ રહે છે. એ તો સહેજે જોઈ શકાશે કે જે અવકાશમાં વિયોગ-પૂર્વધારણા (૨) સમ્પત્તિ હોય તેમાં વિયોગ-પૂર્વધારણા (૧) તો સમ્પત્તિ જ, પણ આથી ઊલટું ન પણ બને. ઉદાહરણ તરીકે ધન પૂર્ણાંકોના સંધ લઈએ અને સ્થાનનિર્દેશક ઉપસંધ કુટુંબના સભ્યો તરીકે ક, $\{1, 2, 3, 4, \dots\}, \{2, 3, 4, 5, \dots\}, \{3, 4, 5, 6, \dots\}, \{4, 5, 6, 7, \dots\}$ ઇત્યાદિ ઉપસંધો લઈએ તો આ ઉપસંધ-કુટુંબ ધન પૂર્ણાંકોના સંધ ઉપર સ્થાન છે એમ તો આસાનીથી જોઈ શકાશે. વળી આ ઉપસંધ કુટુંબ વડે અંકિત સ્થાનસંધ માટે વિયોગ-પૂર્વધારણા (૧) સમ્પત્તિ રહે છે, કારણ કે કેઈ પણ બે ધન પૂર્ણાંકો n અને $n+r$ લઈએ તો,

ઉપસંધ $\{n+r, n+r+1, \dots\}$ આ કુટુંબનો સભ્ય છે તેમાં $n+r$ આવેલ છે પણ n આવેલ નથી. પરંતુ વિયોગ-પૂર્વધારણા (૨) સમવાતી નથી, કારણ કે $n, n+r$ જેવા બે ધન પૂર્ણાંક માટે n ને સમાવતા પ્રત્યેક નિરંખર ઉપસંધમાં $n+r$ આવવાનો જ. એટલે n આવે અને $n+r$ ન આવે એવો નિરંખર ઉપસંધ છે જ નહીં. આમ વિયોગ-પૂર્વધારણા (૨) સમવાતી નથી.

વિયોગ-પૂર્વધારણા (૩)

અવકાશનાં કોઈ પણ બિંદુઓ a, b , માટે નિરંખર ઉપસંધો α_a, α_b એવા મળી શકે કે જેથી $a \in \alpha_a, b \in \alpha_b$ અને $\alpha_a \cap \alpha_b = \emptyset$. વિયોગ-પૂર્વધારણા (૩) હાઉસડોર્ફ વિયોગ-પૂર્વધારણા (Hausdorff axiom) તરીકે ઓળખાય છે. અને આ પૂર્વધારણા સ્થાન-વિજ્ઞાનમાં અમત્યનું સ્થાન ધરાવે છે.

જે અવકાશમાં આ વિયોગ-પૂર્વધારણા (૩) સમવાતી હોય તેમાં વિયોગ-પૂર્વધારણા (૧) અને (૨) બંને આપોઆપ સમવાઈ રહે છે; પણ એથી ઊલટું વિયોગ-ધારણા (૨) [અને (૧)] સમવાતી હોય પણ (૩) ન સમવાતી હોય તેવું કોઈ સ્થાનાવકાશ માટે શક્ય છે. ઉદાહરણ તરીકે, અનંત સમ્યોવાળા સંધ ઉપર, જેના પૂરક સંધો મર્યાદિત સંખ્યાના સમ્યો ધરાવતા હોય તેવા ઉપસંધો અને શૂન્ય સંધથી બનતા ઉપસંધ કુટુંબને સ્થાન તરીકે સર્જે તે તેમાં વિયોગ-પૂર્વધારણા (૨) સમવાઈ રહે છે તે તે આપણે જોયું. પરંતુ આવા સ્થાનાવકાશમાં વિયોગ-પૂર્વધારણા (૩) સમવાશે નહિ; કારણ કે, અવકાશનાં ગમે તે બે બિંદુઓ a, b માટે α_a, α_b નિરંખર ઉપસંધો એવા મળતા હોય કે જેથી $a \in \alpha_a, b \in \alpha_b$ અને $\alpha_a \cap \alpha_b = \emptyset$ હોય તે નીચે મુજબ વિરોધ આવે :

$\alpha_a \cap \alpha_b = \emptyset$ હોવાથી α_a ના પૂરક સંધમાં α_b સમાયેલો હશે, પરંતુ α_b અનંત સમ્યોવાળો હોવાથી અને α_a નો પૂરક સંધ મર્યાદિત સંખ્યાના સમ્યોવાળો હોવાથી અનિષ્ટાપત્તિ દોષ ઉપસ્થિત થાય. આથી આ અવકાશમાં વિયોગ-પૂર્વધારણા (૩) સમવાતી નથી. વિયોગ-પૂર્વધારણા (૩) સાચવતાં સ્થાનાવકાશને હાઉસડોર્ફ (Hausdorff) અવકાશ તરીકે ઓળખવામાં આવે છે. આવા હાઉસડોર્ફ અવકાશોનો અભ્યાસ સ્થાન-વિજ્ઞાનમાં પ્રધાનપણે થાય છે.

૪. સીમાબિંદુ (Limit point) તથા સંવૃત ઉપસંધ (Closed subset)

B , સ્થાનાવકાશ S નો ઉપસંધ હોય અને S ના બિંદુ b ને સમાવતા પ્રત્યેક નિરંખર ઉપસંધ α_b માટે $\alpha_b \cap [B - \{b\}] \neq \emptyset$ હોય તે બિંદુ b ને ઉપસંધ B નું સીમાબિંદુ કહેવાય; અને સ્થાનાવકાશના નિરંખર ઉપસંધના પૂરક ઉપસંધને સંવૃત ઉપસંધ તરીકે ઓળખાવી શકાય. સંવૃત ઉપસંધના મૂળભૂત ગુણધર્મો અંતર-અવકાશમાં સ્થાપિત કરવામાં આવે છે તે રીતે જ લગભગ સાબિત કરી શકાય. B ઉપસંધના સીમાબિંદુઓના સંધને સંધ B ના ઉપસંધ સંધ (B') કહી શકાય અને ઉપસંધ B સંવૃત હોવા માટે જરૂરી અને પર્માણ પ્રતિબંધ $B^* = B$ લગભગ સમાન રીતે મેળવી શકાય.

* $B = B \cup B'$.

૫. બે સ્થાનાવકાશ વચ્ચે સરખામણી

બે સ્થાનાવકાશને સરખાવવાની રીત હવે આપણે જોઈએ. બે સ્થાનાવકાશ સરખા છે એમ કહેવું હોય તો પહેલાં તો બન્ને અવકાશોને સંઘ તરીકે ગણતાં એકના એકના સંઘો બીજાનાં છે એમ માનવું પડે. વળી આ અવકાશોનાં સ્થાનો પણ સરખાં છે એમ પણ સમજવું પડે, એટલે કે એકના નિરંજર ઉપસંધોને અનુરૂપ નિરંજર ઉપસંધો બીજાનાં પણ હોવા જોઈએ.

ગણિતની પરિભાષામાં બે સંઘો S , T સમાન સંઘો (સંખ્યાની દૃષ્ટિએ) તાબા છે એમ કહેવા માટે S માંથી T ઉપર (અને T માંથી વળતાં S ઉપર) એક-એક (one-one) ઉપરિ (onto) રૂપાંતર કે વિધેય (transformation) મળવું જોઈએ. જ્યારે વિધેય f S ઉપરથી T ઉપર હોય ત્યારે તેને $f : S \rightarrow T$ સંકેત વડે દર્શાવીશું.

S ના a , b જેવા કોઈ પણ સંઘો માટે $f(a) = f(b)$ બને ત્યારે $a = b$ થાય તો $f : S \rightarrow T$ એક-એક વિધેય (રૂપાંતર) થાય.

T ના પ્રત્યેક સભ્ય t માટે S નો એકાદ સભ્ય s એવો અસ્તિત્વમાં હોય કે જેથી $f(s) = t$ થાય તો વિધેય f ને ઉપરિ (onto) વિધેય કહેવાય. $f : S \rightarrow T$ ઉપરિ વિધેય ન હોય ત્યારે તેને નિમ્ન (into) વિધેય કહેવાય છે. આમ જ્યારે એક એક ઉપરિ વિધેય $f : S \rightarrow T$ અસ્તિત્વ ધરાવતું હોય ત્યારે S અને T સંઘો સમાન (સંખ્યામાં) સંઘો ધરાવે છે એમ કહી શકાય. $f : S \rightarrow T$ એક-એક ઉપરિ હોય ત્યારે $f^{-1} : T \rightarrow S$ એક એક ઉપરિ રૂપાંતર એવું મળે કે જેથી S ના પ્રત્યેક s માટે $f(s) = t \in T$ હોય ત્યારે $f^{-1}(t) = s$ થાય. બીજી રીતે $f^{-1}f : S \rightarrow S$ અને $ff^{-1} : T \rightarrow T$ અનન્ય (Identity) રૂપાંતર થાય એમ જોઈ શકાશે. S સંઘનો X ઉપસંઘ હોય અને $f : S \rightarrow T$ રૂપાંતર હોય તો X ના પ્રત્યેક બિંદુ x ના f હેઠળના પ્રતિબિંબ $f(x)$ નો સંઘ $f(X)$ સંકેત વડે નિર્દેશાય છે.

હવે $f : S \rightarrow T$ રૂપાંતર હોય અને A_T , T નો ઉપસંઘ હોય તો S નાં જે જે બિંદુઓનું પ્રતિબિંબ A_T માં આવે તે તે બિંદુઓથી બનતા ઉપસંઘને A_T નું પ્રતિબિંબ (Inverse Image) કહે છે અને તેને $f^{-1}(A_T)$ સંકેત વડે દર્શાવાય છે. કોઈ પણ રૂપાંતર f માટે f^{-1} , A_T ઉપરથી S માં રૂપાંતર હંમેશાં ઘર્ષ ન શકે તે તો ખ્યાલમાં આવ્યું જ હશે. આમ f^{-1} સંકેતનો ઉપયોગ મનમાં કોઈ દિશા પેદા ન કરે તેની ચીવટ રાખવી. f^{-1} વિધેય કે રૂપાંતર ન હોય ત્યારે f^{-1} સંકેત એકલો વપરાતો નથી. પરંતુ પ્રતિબિંબના અર્થમાં T ના ઉપસંઘ A_T ની સાથે $f^{-1}(A_T)$ ના અર્થમાં વપરાય છે એ ખ્યાલમાં રાખવું.

૬. વિધેયનું સાતત્ય (Continuity of a function)

સ્થાનાવકાશને સંઘ તરીકે ગણતાં તેમના સંઘોની (સંખ્યાની દૃષ્ટિએ) સમાનતાની સમજણ માટે એક-એક ઉપરિ વિધેય કે રૂપાંતરનો ખ્યાલ જરૂરી છે એમ જોયા બાદ સ્થાનાવકાશોમાંનાં સ્થાનોની સરખામણી કેમ કરવી તે હવે જોઈએ. આમાં નિરંજર સંઘો અને રૂપાંતરનું સાતત્ય અમત્વનો ભાગ ભજવશે. હવે એક પરિભાષા યુક્તિસર અંતર અવકાશ E_1 ના કોઈ

પણ ઉપસંધ A ઉપરથી E_1 માં રૂપાંતર f હોય ($f: A \rightarrow E_1$) નો f ને કોઈ પણ બિંદુ a ઉપર સતત કહેવા માટે આપણે વિધેયજુમાં એમ કહીએ છીએ કે કોઈ પણ ધન સંખ્યા δ માટે જો એવી ધન સંખ્યા $\delta(a)$ અસ્તિત્વ ધરાવતી હોય કે જેથી $(a - \delta, a + \delta)$ અંતરાલમાં A ઉપસંધ સાથેના છેદસંધના કોઈ પણ બિંદુ x માટે, $f(x)$ નું મૂલ્ય $(f(a) - \delta, f(a) + \delta)$ અંતરાલમાં આવે. હવે E_1 અંતર અવકાશમાં કોઈ પણ અંતરાલ નિરંબર સંધ છે, એ આપણે બાણીએ છીએ. એટલે આ વાતને જરા જુદી રીતે આપણે નીચે મુજબ સમજી શકીએ :

E_1 માં $f(a)$ બિંદુ સમાવતા કોઈ પણ નિરંબર ઉપસંધ $I_1 = (f(a) - \delta, f(a) + \delta)$ ને અનુરૂપ a બિંદુ સમાવતો A સંધનો નિરંબર ઉપસંધ $I_2 = (a - \delta, a + \delta)$ એવો મળતો હોય કે જેથી $f(I_2) \subseteq I_1$ થાય તો f વિધેય a બિંદુ આગળ સતત છે એમ કહી શકાય. સામાન્ય સ્થાનશાસ્ત્રમાં વિધેયના સાતત્ય માટે બરાબર આવી જ વ્યાખ્યા લેવાય છે.

વ્યાખ્યા : સ્થાનાવકાશ S ઉપરથી સ્થાનાવકાશ T માં f વિધેય હોય અને S ના a બિંદુ માટે $f(a)$ નો સમાવેશ કરતાં T ના કોઈ પણ નિરંબર ઉપસંધ B માટે S નો a બિંદુ સમાવતો હોય એવો નિરંબર ઉપસંધ A મળતો હોય કે જેથી $f(A) \subseteq B$, તો f વિધેય a બિંદુએ સતત છે એમ કહેવાય. S સ્થાનાવકાશના પ્રત્યેક બિંદુએ સતત હોય એવું વિધેય f , S ઉપર સતત છે એમ કહેવાય છે.

વિધેયના સાતત્ય માટે જરૂરી અને પૂર્ણપ્રતિબંધ નીચે મુજબ પણ આપી શકાય :

પ્રમેય ૨ : $f: S \rightarrow T$ સ્થાનાવકાશ S ઉપરથી સ્થાનાવકાશ T માં વિધેય હોય અને T ના પ્રત્યેક નિરંબર ઉપસંધ B માટે $f^{-1}(B)$, S નો નિરંબર ઉપસંધ હોય તો અને તો જ f વિધેય S ઉપર સતત થાય.

સાબિતી : f વિધેય S ઉપર સતત છે એમ ધારો અને T નો કોઈ પણ નિરંબર ઉપસંધ B લો. $f^{-1}(B)$ નું કોઈ પણ બિંદુ a લઈએ તો $a \in f^{-1}(B)$

$\therefore f(a) \in B$ અને B નિરંબર હોવાથી $f(a)$ ને સમાવતો નિરંબર ઉપસંધ C એવો મળે, જે B નો ઉપસંધ હોય (જુઓ પ્રમેય ૧).

આમ નિરંબર ઉપસંધ C માટે $f(a) \in C$ અને $C \subseteq B$. હવે a બિંદુએ f સતત છે. માટે સાતત્યની વ્યાખ્યા પ્રમાણે ઉપરના C ઉપસંધને અનુરૂપ S નો નિરંબર ઉપસંધ D એવો મળે જેમાં $a \in D$ અને $f(D) \subseteq C \subseteq B$.

આમ $f(D) \subseteq B$ હોવાથી $D \subseteq f^{-1}(B)$, અને $a \in D$, $D \subseteq f^{-1}(B)$ તથા D નિરંબર હોવાથી $f^{-1}(B)$ નિરંબર થાય (જુઓ પ્રમેય ૧). આમ f વિધેય S ઉપર સતત હોય તો T ના કોઈ પણ નિરંબર ઉપસંધ B માટે $f^{-1}(B)$ નિરંબર થશે.

હવે ધારો કે વિધેય f માટે T ના કોઈ પણ નિરંબર ઉપસંધ માટે તેનો પ્રતીય બિંબ S માં નિરંબર છે. તો S નું કોઈ પણ બિંદુ a લઈને $f(a)$ ને સમાવતો T નો નિરંબર ઉપસંધ B લો.

$f(a) \in B \therefore a \in f^{-1}(B)$ અને પક્ષ પ્રમાણે B ઉપસંધ T માં નિરંબર હોવાથી $f^{-1}(B)$, S માં નિરંબર થશે. તથા $f[f^{-1}(B)] = B \subseteq B$ હોવાથી f વિધેય a બિંદુએ સતત છે, અને તેથી S ઉપર સતત છે; આમ પ્રમેય ૨ ની સાબિતી પૂરી થઈ.

૭. અનન્ય અવકાશો અને અનન્યતા સ્થાપક (Homeomorphic Spaces and Homeomorphism)

હવે બે સ્થાનાવકાશોની સરખામણી કરતી વખતે f વિધેય વડે S ના નિરંબર ઉપસંધો T ના નિરંબર ઉપસંધો બનતા હોય અને પ્રતીપ વિધેય દ્વારા T ના નિરંબર ઉપસંધો S ના નિરંબર ઉપસંધો બનતા હોય તો S અને T અવકાશોનાં સ્થાનો અનન્ય છે એમ કહી શકાય. આમ થવા માટે f વિધેય S ઉપર સતત હોવું જોઈએ અને f ને પ્રતીપ વિધેય f^{-1} હોવું જોઈએ, તથા f^{-1} , T ઉપર સતત હોવું જોઈએ; આમ આ પરિસ્થિતિમાં બે અવકાશો S , T ને સમાન કે અનન્ય (Homeomorphic) કહી શકાય.

આમ બે સ્થાનાવકાશો S અને T માટે કોઈ એવું વિધેય $f: S \rightarrow T$ મળતું હોય જે એક-એક ઉપરિ હોય, S ઉપર સતત હોય. અને તેનું પ્રતીપ વિધેય T ઉપર સતત હોય તો S અવકાશ T અવકાશને અનન્ય (S is homeomorphic to T ; $S \cong T$) છે, એમ કહેવાય છે. અને f વિધેયને S ની T પ્રતિ અનન્યતા સ્થાપક (Homeomorphism) કહેવાય છે. એ તો સરળ છે કે જો $S \cong T$ તો $T \cong S$. આમ S , T ને અનન્ય છે એમ કહેવા ને બદલે S અને T અનન્ય અવકાશો છે એમ પણ કહી શકાય.

૮. સ્થાનધર્મ અને સ્થાનશાસ્ત્ર (Topological Property and Topology)

હવે S અવકાશના જે ગુણધર્મો અનન્યતા સ્થાપક પરત્વે રક્ષિત રહેતા હોય એવા ગુણધર્મોને અવકાશના સ્થાનધર્મો (Topological Properties) કહીએ તો સ્થાનશાસ્ત્રની નીચે મુજબ સમજણ આપી શકાય :

મણિતની જે પેઢાશાખામાં સ્થાનાવકાશના સ્થાનધર્મોનો અભ્યાસ થતો હોય તે પેઢા-શાખાને સ્થાનશાસ્ત્ર (Topology) કહેવાય.

૯. વિશિષ્ટ સ્થાનધર્મો

અંતમાં આ લેખ પૂરો કરતાં પહેલાં કેટલાક સ્થાનધર્મો તરફ અંગ્રુલિનિર્દેશ કરી બાંધીએ. ૨૫૯ છે કે—

(૧) સ્થાનાવકાશનું હાઉસડોર્ફ અવકાશ હોવું.

(૨) સંધનું નિરંબર હોવું એ બંને સ્થાનધર્મો છે.

છેલ્લે અંતર અવકાશની લેખમાળામાં યુક્લિડિયન અંતર અવકાશમાં એ અવકાશનો સીમિત (bounded) સંઘટ કોઈ પણ ઉપસંધ અવૃદ્ધ (Compact) ઉપસંધ છે અને આવો અવૃદ્ધ ઉપસંધ ‘હાઈન-બોરેલ’ ગુણધર્મ સાચવે છે એ આપણે જોઈએ છે. સામાન્ય સ્થાનશાસ્ત્રમાં, સ્થાનાવકાશ S હાઉસડોર્ફ અવકાશ હોય અને તે હાઈન-બોરેલ ગુણધર્મ સાચવતો હોય ત્યારે તે અવૃદ્ધ કહેવાય તેમ કહીએ તો,

(૩) અવકાશનું અવૃદ્ધ હોવું તે પણ સ્થાનધર્મ છે.

Summary

This matter under the caption 'General Topology' is an effort to introduce in Gujarati the notion of Topology and a criterion to distinguish between different topological spaces.

The first article is meant to provide some background for the ideas to be discussed later. 'Geometry of a rubber-sheet' approach to understand 'topology' is explained and a 'topological space' is defined through a family of subsets having the usual three properties, viz. (1) The null subset and the whole set are members of this family; (2) arbitrary union of subsets of this family is again a subset of the family; and (3) inter section of finite number of subset of the family is a subset of the family.

Open subsets are then defined in the second article and a theorem that "a subset O of a topological space S is open if and only if for every $a \in O$ there exists an open subset A of S such that $a \in A$ and $A \subseteq O$ " is proved here.

Three separation axioms are introduced in article three and examples of topological spaces which satisfy these axioms are given. Hausdorff space is defined and an example of a topological space which is not a Hausdorff space is given.

Notions of 'limit point' and 'closed subsets are brought out in the fourth article and the next two articles deal with the notion of function on one topological space into another and its continuity. It is also proved that $f: S \rightarrow T$ is continuous on S if and only if for every open subset B of T , its inverse image $f^{-1}(B)$ is an open subset of S .

Homeomorphism between two topological spaces is defined in article seven. Equivalence of two topological spaces is also defined here.

The last two articles are concerned with topological properties. Topological properties are those which remain invariant under a homeomorphism. Hausdorff property, openness and compactness are cited as examples of topological properties.

OCCURRENCE OF *CHARACIOSIPHON RIVULARIS* IYENG. FROM GUJARAT

R. J. PATEL and J. J. SHAH

*Botany Department, Sardar Patel University
Vallabh Vidyanagar*

Characiosiphon, a new genus in Chlorococcales, was established in 1936 (Iyengar, 1936). The material was collected from shallow stream of water at Vaiyampatti near Trichinopoly in South India. A complete account of its asexual and sexual reproduction was published later (Iyengar, 1954). The plant is also reported from different parts of the country viz., Gwalior, Jodhpur, Tirupatti, Lukhnow and Bombay (Agarkar, 1953; Rao, 1954; Bhandari, 1955).

The present material was collected in 1961 from a river at Balaram, a place about 13 kms. away from Palanpur. It was found growing in clusters attached to the stone in slow moving water.

Fully developed plants are 1.0 to 1.25 cms. long, green, cylindrical, broad at the top and narrow towards the base. Occasionally a short stalk, up to 1.5 mm. is seen near the base of the thallus (Fig. 1). At the end of the stalk, a coalescent disc is developed, by means of which the plant is attached to the substratum (Fig. 2). The diameter of the filament varies from 0.5 to 1.0 mm. Few plants had their terminal portions bent like a hook (Fig. 3). The diameter of the bent region is about 1.3 mm. Sometimes constrictions are seen in the plants (Fig. 4). The wall of the filament is 1.6 to 3.2 μ thick. Protoplasts are 12.0 to 16.0 μ in diameter (Fig. 5). They are separate from one another and somewhat spherical in outline near the base. They are compactly arranged and angular at the upper part of the thallus.

From the previous records it seems that plants grow in flowing (Iyengar, 1936, 1954; Rao, 1954) and stagnant water (Bhandari, 1955). Lobations in the plants, observed by Agarkar (1963) and Bhandari (1955) could not be observed in the present material. Spherical and globular plants reported by Bhandari (1955) are also not seen in our material.

The length of the plants, collected by us, agrees with that reported by earlier workers (Iyengar, 1936, 1954; Agarkar, 1953; Rao, 1954; Bhandari, 1955). The breadth differs in being smaller compared to that reported by Rao and Bhandari (1954, 1955) and agrees with that given by Iyengar (1936).

References

- Agarkar, M. S. 1953. 'Note on *Characiosiphon rivularis* Iyengar from Gwalior.' Curr. Sci. **22** : 245.
- Bhandari, M. M. 1955. 'Occurrence of *Characiosiphon rivularis* Iyengar.' Curr. Sci. **24** : 16-17.
- Iyengar, M. O. P. 1936. '*Characiosiphon*' A new member of the Chlorophyceae (Preliminary note) J. Indian Bot. Soc. **15** : 313-318.
- 1954. 'On the asexual and sexual reproduction of *Characiosiphon rivularis*, Iyengar.' J. Indian Bot. Soc. **33** : 148-151.
- Rao, K. V. S. 1954. '*Characiosiphon*' from Tirupatti. Curr. Sci. **23** : 191.

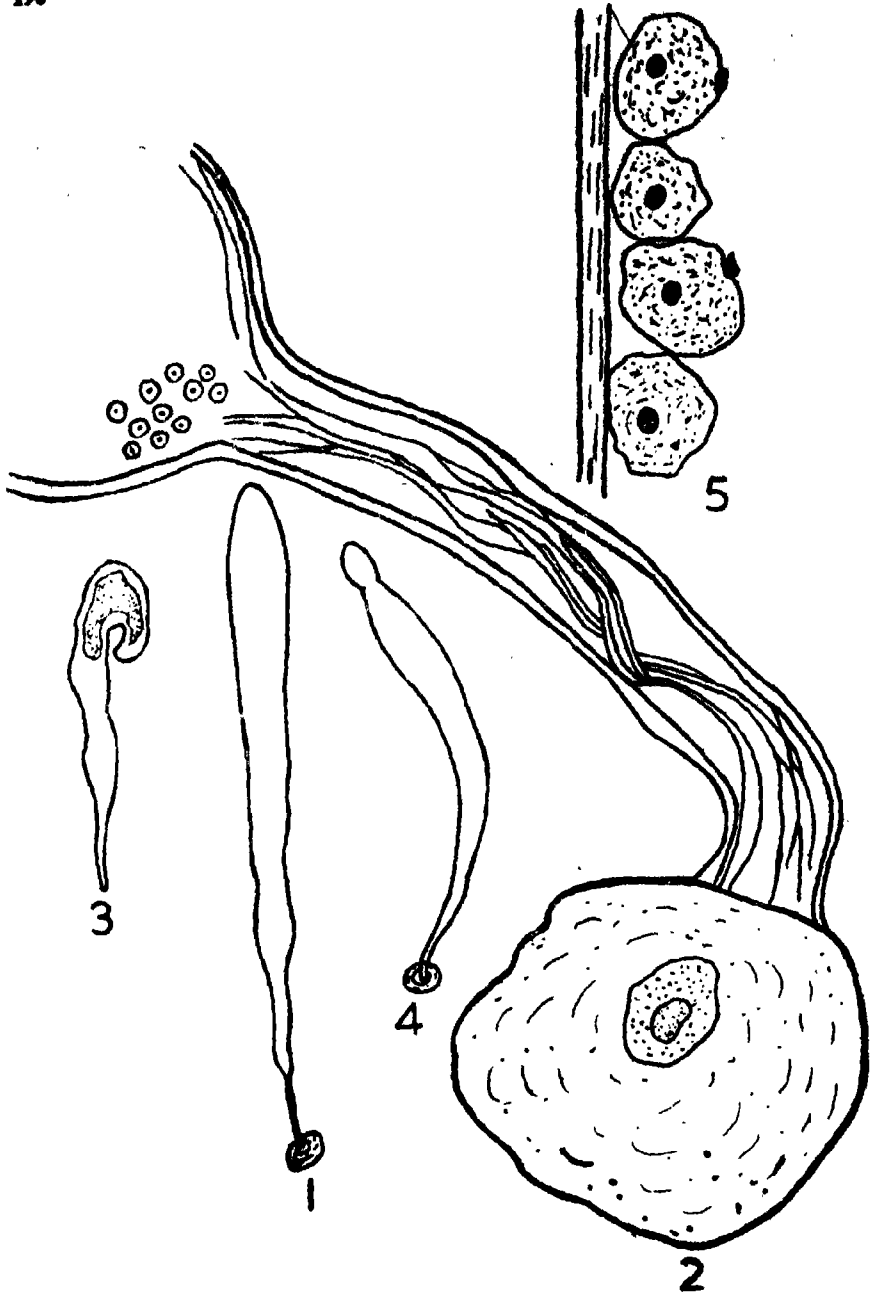


Fig. 1. Entire plant with a stalk and a disc. X 10.

Fig. 2. Coalescent disc. Note the peculiar appearance of the cell wall. X 690.

Figs. 3 and 4. Entire plant with a bent-tip and a constriction respectively. X 10.

Fig. 5. Portion of cell wall and protoplast. X 1550.

"FLORA OF VALLABH VIDYANAGAR AREA"

J. G. CHOHAN,

J. A. INAMDAR AND M. B. DESHPANDE

Introduction

The flora of Gujarat is not fully described. Saxton and Sedgwick (1918) described the plants of North Gujarat. The notable contributions in the floristic studies of Gujarat are by Jaykrishna (1910), Santapau (1950, 1952, 1953, 1955), Chavan and his students (1961, 1962) and Shah (1963). The authors feel that the flora of the area of Vallabh Vidyanagar, being the site of the University, should be well-known. In the present paper, the plants found in Vallabh Vidyanagar and its environs are listed. The area investigated for this work is about 16 sq./Kms.

Vallabh Vidyanagar is situated 22° 34' north and 72° 56' east in the North-west part of Kaira district in Gujarat State. It is a flag-station about six Kms. from Anand on Anand-Cambay broad guage line. The area is also accessible by the state transport buses.

The soil of the area in most places is alluvial; at some places, it is black-clay. The average rainfall is about 70-85 cms. The rainy season begins by about the middle of June and lasts till the beginning of October. August is the wettest month.

General Pattern of Vegetation

The vegetation of the area is of the scrub forest type, the dominant plants being *Acacia arabica* Willd., *Balanites aegyptiaca* Del, *Capparis decidua* Pax, *Gymnosporia spinosa* (Forsk.) Fiori, *Prosopis spicigera* Linn., *Zizyphus nummularia* W. & A. The other plants which form a part in the composition of scrub forest vegetations are *Dichrostachys cinerea* W. & A., *Mimosa hamata* Willd. During monsoon, the grasses are very common

and abundant. Of them *Apluda mutica* Linn., *Saccharum spontaneum* Linn., *Sorghum halepense* Pers. often grow gregariously. *Saccharum spontaneum* Linn., the tallest grass in the area, is conspicuous by the silvery white spike. *Dactyloctenium aegyptium* Beauv., *Digitaria adscendens* Henr., *Echinochloa colonum* Link., *Perotis indica* O.K. and *Setaria verticillata* Beauv., are also common. A number of dicotyledonous plants are found growing intermixed with these grasses. To mention a few, they are *Borreria articularis* F. N. Willd., *Cleome viscosa* Linn., *Enicostemma verticillata* Baill., *Evolvulus alsinoides* Linn., *Heliotropium marifolium* Retz., *Hybanthus enneaspermus* F. Muell. and *Polygala erioplera* DC.

By the end of monsoon, most of the grasses dry up. During winter, a number of plants, characteristic of cold season sprout up, many of them often forming large patches *Barleria prionitis* Linn., *Blumea* various species, *Peristrophe bicalyculata* Nees are abundant.

Vegetation along Road sides and Railway lines

A number of trees are planted along road sides as shade or avenue trees. They are *Azadiracta indica* Juss., *Albizzia lebbek* Bth., *Albizzia procera* Bth., *Cassia* various species, *Delonix regia* Ref., **Jacaranda acutifolia* Humb. & Bonpl., (= *J. ovalifolia* R. Br. or *J. mimosaeifolia* Don) *Peltophorum pterocarpum* Baker., *Polyalthia longifolia* (Sonn.) Thw. *Crataeva nurvala* Buch., *Cordia rothii* R. & S. *Diospyros cordifolia* Roxb., *Mangifera indica* Linn., *Manilkara hexandra* Dub., *Tamarindus indica* Linn. and *Madhuca indica* Gmel. are common along hedges and around cultivated fields.

On the hedges, a number of twiners belonging to the families Asclepiadaceae, Convolvulaceae, Cucurbitaceae, Menispermaceae, Papilionaceae, Sapindaceae, Vitaceae, etc. are common. Among the conspicuous ones by the masses of brightly coloured flowers are *Canavalia gladiata* DC., *Luffa* sp., *Momordica dioica* Roxb., *Mucuna prurita* HK., *Oxystelma*, *secamone* Karst.

* The nomenclature of this plant is that given in Bailey's Man. Cult. Pl. 1949 (Macmillan), page 907.

Vegetation of cultivated fields

In the rainy season, the following cereals are extensively cultivated; *Eleusine coracana* Gaertn., *Paspalum scrobiculatum* Linn., *Pennisetum typhoideum* A. Rich. In some fields *Oryza sativa* Linn. is also cultivated. *Abelmoschus esculentus* Moench., *Luffa acutangula* Roxb., *Luffa cylindrica* Roem. and Schult., *Trichosanthes dioica* Roxb., etc. are cultivated for the fruits used as vegetables. In winter, the second crop is taken in most of the fields. *Cajanus cajan* Millsp., *Dolichos lablab* Linn., *Gossypium* sp., *Nicotiana tabacum* Linn., *Phaseolus aconitifolius* Jacq. and *Vigna sinensis* Savi are extensively cultivated. Some members of the families Cruciferae and Umbelliferae and *Triticum* sp. are also cultivated in some fields.

From these fields, a number of weeds were collected. *Ammannia baccifera* Linn., *Ammannia multiflora* Roxb., *Bergia odorata* Edgew., *Polycarpaea corymbosa* Lamk., *Trichodesma zeylanicum* R. Br. and *Oligochaeta ramosa* (Roxb.) Wagenitz. are very common. Other common plants are *Bergia ammannioides* Roxb., *Chrozophora prostrata* Dalz., *Convolvulus microphyllous* Sieb., *Dopatrium junceum* B.-Ham., *Euphorbia thymifolia* Linn., *Euphorbia hirta* Linn., *Glossostigma diandra* (Linn.) O. K. *Spaeranthus indicus* Linn., and *Vahlia digyna* O. K.

In the fields where wheat is cultivated *Aspodelus tenuifolius* Cav., occurs in large patches. *Anagallis arvensis* var. *coerulea* Gren & Godr. is occasionally found.

Pond Vegetation

Only a few water plants have been found in the area studied. *Hydrilla verticillata* Royle *Ipomoea aquatica* Forsk., *Utricularia stellaris* Linn. and *Nymphaea stellata* Willd. *Lemna* sp. are the only common plants seen in some ditches.

Parasites in the Area

Cuscuta reflexa Roxb. is one of the commonest parasite in the area seen on a number of host plants. The other parasite noted are *Orabanche cernua* Loeffl. on *Nicotiana tabacum* Linn.

Striga densiflora Bth. on grasses and *Striga gesneroides* Vatk on *Euphorbia nivulia* Buch-Ham.

Enumeration of Plants

The following is the list of wild plants excluding plants cultivated in gardens. The present paper deals with vegetation of Vallabh Vidyanagar area. The Nomenclature followed here is in accordance with rules of International Code of Botanical nomenclature ed. 1961, and in light of modern researches. Most of the names are those given in Cooke's Flora (1901-1908); where the name is changed, the name, which is correct in our opinion is given first; this is followed by the name given by Cooke. The plants collected from the present area are deposited in the Herbarium of V. P. Mahavidyalaya.

Annonaceae

1. *Annona reticulata* Linn. रामईण
2. *A. squamosa* Linn. सीताईण
3. *Polyalthia longifolia* (Sonn.) Thw. आसोपासव
P. longifolia Bth. and H. K. f.

Menispermaceae

4. *Cissampelos pereira* Linn. पहाडवेस, लघुपाठा
5. *Cocculus hirsutus* (Linn.) Diels वेवडी
C. villosus DC.
6. *Tinospora cordifolia* (Willd.) Miers. गणै

Nymphaeaceae

7. *Nymphaea stellata* Willd. नीलकमल, पोयण्ण

Papaveraceae

8. *Argemone mexicana* Linn. काडी

Cruciferae

9. *Brassica juncea* H. K. f. and Thom. राई
10. *B. nigra* Koch. मोटी काणी राई

Capparaceae

11. *Cadaba fruticosa* (Linn.) Druce पोखरु, तबिये
हेमकंड

C. indica Linn.

C. farinosa Forsk.

12. *Capparis decidua* (Forsk.) Pax 1231
C. aphylla Roth.
 13. *C. sepiaria* Linn. 842
 14. *Cleome gynandra* Linn. 843, 844, 845, 846, 847
Gynandropsis pentaphylla DC.
 15. *C. viscosa* Linn. 848
 16. *Crataeva nurvala* Buch. 849
C. religiosa Forst. f.
 17. *Maerua arenaria* H.K. f. and Th. 850
M. ovalifolia Camb.

Violaceae

18. *Hybanthus enneaspermus* (Linn.) F. Muell. 851
Ionidium heterophyllum Vent.

Polygalaceae

19. *Polygala erioptera* DC. 852

Caryophyllaceae

20. *Polycarpha corymbosa* Lamk. 853
 21. *Spergula arvensis* Linn.

Portulacaceae

22. *Portulaca oleracea* Linn. 854
 23. *P. quadrifida* Linn. 855

Elatinaceae

24. *Bergia ammannioides* Roxb. 856
 25. *B. odorata* Edgew. 857

Bombacaceae

26. *Bombax ceiba* Linn. 858
Salmalia malabarica (DC.) Sch. & Endl.

Malvaceae

27. *Abelmoschus esculentus* (Linn.) Moench. 859
Hibiscus esculentus Linn.
 28. *Abutilon indicum* Sw. 860
 29. *Gossypium arboreum* Linn. 861
 30. *G. herbaceum* Linn. 862
 31. *Hibiscus cannabinus* Linn. 863

32. *H. lobatus* (Murr.) O. K. તથી
 H. solandra L Her.
 33. *H. micrathus* Linn. f. અડખાઉ બપોરિયો
 34. *H. panduraeformis* Burm. f.
 35. *H. sabdriffa* Linn. લાલ અગોર્ધ
 36. *Malachra capitata* Linn. પરદેશી બીડો
 37. *Pavonia seylanica* Cav. અડારિયા
 38. *Sida acuta* Burm. f. બલા
 39. *S. alba* Linn. નાચબલા
 S. spinosa Linn. p. p.
 40. *S. cordifolia* Linn. બલા-બલદાણી
 41. *S. rhombifolia* Linn. var. *retusa* Master. જેતરાઉ બલા
 42. *S. veronicifolia* Lamk. બેલિબલા

Sterculiaceae

43. *Melochia corchorifolia* Linn. મેથૂરી
 44. *Waltheria indica* Linn.

Tiliaceae

45. *Corchorus aestuans* Linn. છૂંછ, શતેલી
 C. acutangulus Lam.
 46. *C. capsularis* Linn. મોરછૂંછ
 47. *C. fascicularis* Lamk. છૂંછડી
 48. *C. olitorius* Linn. મોટી છૂંછ
 49. *C. trilocularis* Linn. લાંબી છૂંછ
 50. *Grewia flavescens* Juss. ખટપટી
 G. pilosa W. & A. et alior., non Lamk.
 51. *Triumfetta rotundifolia* Lam. ઝીપટો
 52. *T. rhomboidea* Jacq. ઝીપટી

Zygophyllaceae

53. *Tribulus terrestris* Linn. આડું ગોખરુ

Geraniaceae

54. *Oxalis corniculata* Linn. ચાંગેરી, અખટી

Rutaceae

55. *Aegle marmelos* Corr. ખીલી
 56. *Feronia limonia* (Linn.) Swingle ઢાઠી
 F. elephantum Corr.

Simarubaceae

57. *Ailanthus excelsa* Roxb. અરડૂસો

Balanitaceae

58. *Balanites aegyptiaca* Del છોરિયો
B. roxburghii Planch.

Meliaceae

59. *Azadirachta indica* A. Juss. લીમડો
 60. *Melia azaderach* Linn. બકાન-લીમડો

Celastraceae

61. *Celastrus paniculata* Willd. માલકાંચુ
 62. *Gymnosporia spinosa* (Foesk.) Fiori વીકળો
G. montana Bth.

Rhamnaceae

63. *Zizyphus mauritiana* Lamk. બોરડી
Z. jujuba Lamk. non Mill.
 64. *Z. nummularis* (Burm. f.) W. & A. ચણીબોરડી
Z. rotundifolia Lamk.
 65. *Z. oenoplia* Mill. એરમડી

Vitaceae

66. *Cayratia carnosa* Gagnep. ખાટખટખો
Vitis trifolia Auct. non Linn.

Sapindaceae

67. *Cardiospermum halicacabum* Linn. કાગડોળિયો, કરોળિયો
 68. *Sapindus laurifolius* Vahl. અરીડી

Anacardiaceae

69. *Mangifera indica* Linn. અંબો

Moringaceae

70. *Moringa oleifera* Lamk. મીઠો સરગવો
M. pterygosperma Gaertn.

Papilionaceae

71. *Abrus precatorius* Linn. અણેહી, ગુંજ
 72. *Aeschynomene indica* Linn. (ઈંકડ) સોયા
 73. *Alysicarpus monilifer* Edgew.
 74. *A. vaginalis* (Linn.) DC. બેંચ સમેરવો

75. *Arachis hypogea* Linn. ભોંયચિંચ, મગફળી
76. *Butea monosperma* (Lamk.) Taub. ખાખરા, કેમ્પેડો
B. frondosa Roxb.
77. *Cajanus cajan* (Linn.) Mill. દુવેર
C. indicus Spreng.
78. *Canavalia gladiata* (Jacq.) DC. આબ્યાવેલ
C. ensiformis Baker non DC.
79. *Cicer arietinum* Linn. ચણા
80. *Clitoria ternatea* Linn. ચરણી બીબરી
81. *Crotalaria burhia* Buch-Ham. વગડાઉ શણ, ખરણણ
82. *C. juncea* Linn. શણ
83. *C. linifolia* Linn. f. અડબાઉ શણ
84. *C. medicaginea* Lamk. રણમેથી, ઝીલ
85. *C. retusa* Linn. ધૂધરા
86. *Cyamopsis tetragonoloba* (Linn.) Taub. ગુવાર
C. psoraloides DC.
87. *Dalbergia sissoo* Roxb. સીસમ
88. *Desmodium gangeticum* (Linn.) DC. ગોટકડો પાંદડિયો
89. *D. triflorum* (Linn.) DC. ઝીણુકો પાંદડિયો
90. *Heylandia latebrosa* (Linn.) DC. અડદયો
91. *Indigofera cordifolia* Heyne ex Roth દાળિયો, ભાખો
92. *I. hirsuta* Linn. રંજાળી ગળી
93. *I. linifolia* Retz. નાની ગળી
94. *I. linnaei* Ali ભોંય ગળી
I. enneaphylla Linn. non illegit.
95. *I. paucifolia* Del. ઝીલડી
96. *I. tinctoria* Linn. ગળી
97. *Medicago sativa* Linn. મદય, રજકો
98. *Mucuna pruri* Hook. f. કવચ
M. pruriens Baker non DC.
99. *Pisum sativum* Linn. વઢાણા
100. *Pongamia pinnata* (Linn.) Pier. કણ્ઝી
P. glabra Vent.
101. *Rhynchosia minima* (Linn.) DC. ઝીણુકી કમર વેલ
102. *Sesbania bispinosa* (Jacq.) F. & R. લીસી ઈંકડ
S. aculeata Poir. Encye.
103. *Tephrosia purpurea* (Linn.) Pers. સુરખખો
104. *T. villosa* (Linn.) Pers. રંજાળો સુરખખો

105. *Teramnus labialis* (Linn.f.) Spreng. વાલિયો વેશે
106. *Zornia diphylla* (Linn.) Pers. સમરાપાની

Caesalpinaceae

107. *Bauhinia racemosa* Lamk. આસોદરો
108. *Cassia absus* Linn. ચીમેડ
109. *C. auriculata* Linn. આવળ
110. *C. fistula* Linn. ગરમાળો
111. *C. occidentalis* Linn. કાસુદરો
112. *C. obtusa* Roxb. બેંચ આવળ, સોનામુખી
113. *C. pumila* Lamk. ચીમેડિયુ
114. *C. sophera* Linn. કાળી કાસુદી
115. *C. tora* Linn. કુવાડિયો
116. *Caesalpinia crista* Linn. p.p. કાચકાં
C. bonducella Flem.
117. *Delonix elata* (Linn.) Gamble સપેસરો
Poinciana elata Linn.
118. *Tamarindus indica* Linn. આમલી

Mimoseae

119. *Acacia arabica* (Lamk.) Willd. બાવળ
120. *A. farnesiana* (Linn.) Willd. રામ બાવળ
121. *Albizzia lebbek* (Linn.) Bth. કાળિયો સરસ
122. *A. procera* Bth. કીનાઈ
123. *Dichrostachys cinerea* (Linn.) W. & A. મોરદુડિયુ
124. *Mimosa hamata* Willd. કઈ બાવળ, કસી
125. *Pithecellobium dulce* (Roxb.) Bth. ગોરસ આમલી
126. *Prosopis juliflora* DC.
127. *P. spicigera* Linn. સમી

Vahliaceae

128. *Vahlia digyna* (Retz.) O.K. પીળો આંજિયો
V. viscosa Roxb.

Combretaceae

129. *Combretum ovalifolium* Roxb. મદવેલ

Myrtaceae

130. *Syzygium cumini* (Linn.) Skeels બાંયુ
Eugenia jambolana Lam.

Lythraceae

131. *Amarantus baccifera* Linn. બલખાચિયો
 132. *A. multiflora* Roxb.
 133. *Lawsonia inermis* Linn. મેંદી

Onagraceae

134. *Ludwigia parviflora* Roxb.

Trapaceae

135. *Trapa bispinosa* Roxb. શીંગોડાં

Cucurbitaceae

136. *Blastaria garcini* (Linn.) Cogn.
 137. *B. finbristipula* (Fenzl.) Kotschy
 et Pen. આંખડુટામણી
 138. *Citrullus colocynthis* (Linn.) Schrad. ઇન્દ્રવરણી
 139. *Coccinia cordifolia* (Linn.) Cogn. ઘીનોડી
C. indica W. & A.
 140. *Cucumis callosus* (Rottl.) Cogn. ગાયવસુકણી
C. trigonus Roxb.
 141. *Cucurbita maxima* Duch. ડાળું
 142. *Luffa acutangula* var. *amara* Clarke પાડવેલાં
 143. *L. acutangula* Roxb. તુરિયાં
 144. *L. cylindrica* (Linn.) Roem and Schul. ગલકાં
L. aegyptiaca Mill.
 145. *Melothria maderaspatana* (Linn.) Cogn. ચણકચીનોડી
 146. *Momordica charantia* Linn. કારેલાં
 147. *M. cochinchinensis* Spreng. વાડકારેલાં
 148. *M. dioica* Roxb. કોકોડાં
 149. *Trichosanthes anguina* Linn. પડોળાં
 150. *T. cucumerina* Linn. જંગલી પરવળ
 151. *T. dioica* Roxb. પરવળ

Molluginaceae

152. *Glinus lotoides* Linn. ઘોળો આખરાડ
Mollugo hirta Thunb.
 153. *Glinus oppositifolius* (Linn.) A. DC. કડવો આખરાડ
Mollugo oppositifolia Linn.
 154. *Mollugo pentaphylla* Linn. ઝરેલ

Ficoidaeae

155. *Trianthema secundaria* Linn. വസു, വിഷ്ണുപുര
 T. pentandra Linn.
 156. *T. portuacastrum* Linn. പുനമ്പാ
 T. monogyna Linn.

Umbelliferae

157. *Anethum graveolens* Linn. ചുവ
 Peucedanum grandie Clarke
 158. *Centella asiatica* (Linn.) Urb. ചാക്കി
 Hydrocotyle asiatica Linn.
 159. *Foeniculum vulgare* Gaertn. വരിയങ്ങി

Alangiaceae

160. *Alangium salvifolium* (Linn. f.) Wang. ചുങ്കാല
 A. lamarckii Thw.

Rubiaceae

161. *Borreria articularis* (Linn. f.) മധുരീ ജടി
 F. N. Will
 Spermacoce hispida Linn.
 162. *Gardenia turgida* Roxb. തേങ്ങി
 163. *Mitragyna parvifolia* (Roxb.) Korth. കടമ്പ
 164. *Oldenlandia corymbosa* Linn. പരപ്പ

Compositae

165. *Acanthospermum hispidum* DC.
 166. *Ageratum conyzoides* Linn. ചെറുചെടി
 167. *Bidens biternata* (Lour.) Merr. & ചെറുതേങ്ങി
 Shreff.
 B. pilosa Auct. non Linn.
 168. *Blainvillea acmella* (Linn.) Philip. ചെറു തേങ്ങി
 B. rhomboidea Cass.
 169. *Blumea bifoliata* DC.
 170. *B. eriantha* DC.
 171. *B. mollis* (Don.) Merrill
 B. wightiana Din.
 172. *B. lacera* (Linn.) DC. ചെറുതേങ്ങി
 173. *Caesulia axillaris* Roxb.
 174. *Echinops echinatus* Roxb. ഉടകി
 175. *Eclipta prostrata* (Linn.) DC. ചെറുതേങ്ങി

176. *Emilia sonchifolia* (Linn.) DC. ઢીરજીખુરી,
સોનાળી પાથરી
ફલવો
177. *Gnaphalium indicum* Linn.
178. *Gynura* sp.
179. *Laggera aurita* Schult.
180. *Launaea nudicaulis* Hook.f. મોટી બોંપાત્રી
181. *L. sarmentosa* (Willd.) Alst. બોંપાત્રી
L. pinnatifida Cass.
182. *Oligochaeta ramosa* (Roxb.) Wagenitz.
Volutarella divaricata Bth. & HK. f.
183. *Pulicaria angustifolia* DC. શીશોરિયાની જાત
184. *Spaeranthus indicus* Linn. મોરખમુંડી
185. *Tridax procumbens* Linn. પરદેહી બાગડો
186. *Xanthium strumarium* Linn. ગાડરિયું

Plumbaginaceae

187. *Plumbago zeylanica* Linn. ચિત્રક

Primulaceae

188. *Anagallis arvensis* Linn. var. *coerulea*
Gren & Godr. કાળી ફૂલડી

Sapotaceae

189. *Madhuca indica* Gmel. મહુડો
Bassia latifolia Roxb.
190. *Manilkara hexandra* (Roxb.) Dub. રાયજુ
Mimusops hexandra Roxb.

Ebenaceae

191. *Diospyros cordifolia* Roxb. ઢેડા

Salvadoraceae

192. *Salvadora oleoides* Dcne. નાનો પીલુ, મીઠી જર
193. *S. persica* Linn. મોટો પીલુ, ખારી જર

Apocynaceae

194. *Catharanthus pusilla* G. Don. નાની ખારમાસી
Lochnera pusilla K. Schum.
195. *Holarrhena antidysenterica* (Linn.) Wall.
કડવો ઇન્દ્રજવ

Asclepiadaceae

196. *Calotropis gigantea* (Linn.) R. Br. મોટો આકડો
197. *C. procera* R. Br. નાનો આકડો

198. *Cryptostegia grandiflora* (Roxb.) R. Br. અમરવેલ
199. *Leptadenia reticulata* W. & A. નાની ડાંડી
200. *Oxystelma secamone* (Linn.) Karst. અમરવેલ
 O. esculentum R. Br.
201. *Pentstemon capensis* (Linn. f.) Bullock. શીંગડા
 P. microphylla (Roxb.) W. & A.
202. *Pergularia daemia* (Forsk.) Chiov. અમરવેલ
 Daemia extensa R. Br.
203. *Telosma pallida* (Roxb.) Craib. વર્ષાડાંડી
 Pergularia pallida W. & A.

Gentianaceae

204. *Enicostemma verticillata* (Willd.) Baill. નાનું કરિયાણું,
 મામેજવો, કડવી નઈ
 E. littorale Blume

Boraginaceae

205. *Coldenia procumbens* Linn. બાસરિયો ઓખરાડ
206. *Cordia obliqua* Willd. વડગુદી
 C. myxa Auct non Linn.
207. *C. rothii* R. & S. ગૂંદી
208. *Heliotropium marifolium* Retz. ઝીણું હાથીસુંઢું
209. *H. ovalifolium* Foesk. વેલાળાં હાથીસુંઢું
2010. *H. subulatum* Hochst. જુડુંદી
 H. zeylanicum Clarke non Lamk.
211. *H. supinum* Linn. ઘેડીઓ ઓખરાડ
212. *Trichodesma zeylanicum* R. Br. ઊંધાફૂલ

Convolvulaceae

213. *Convolvulus acvensis* Linn.
214. *C. microphyllus* Sieb. શંખાવલી
 C. pluricaulis Choisy
215. *Cuscuta reflexa* Roxb. અમરવેલ
216. *Evolvulus alsinoides* Linn. કાળી શંખાવલી
217. *Ipomoea cairica* (Linn.) Sw.
 I. palmata Forsk.
218. *I. hederifolia* Linn.
 Quamoclit coccinea Cooke non Moench.
219. *I. muricata* Jacq. અમરડી
220. *I. obscura* Ker-Gawl. વજવેલ

221. *I. pestigridis* Linn. વાથપદી
 222. *I. quamoclit* Linn.
 I. vulgaris Choisy
 223. *I. sinensis* Choisy ધોળી કુદરદી
 I. calycina Clarke
 224. *I. sepiaria* Koenig ex Roxb. હનુમાનવેલ
 225. *Merremia aegyptia* (Linn.) Urb. પાંચ પાનની કુદરદી
 M. pentaphylla (Linn.) Hall. f.
 226. *Merremia chryseides* Hall. f.
 227. *M. emarginata* (Burm. f.) Hall. f. હિરકાની
 228. *M. hastata* (Des.) Hall. f.
 229. *M. tridentata* (Linn.) Hall. f. મોરમા, ભીંતગરિયો

Solanaceae

230. *Capsicum annuum* Linn. મરચી
 231. *Datura innoxia* Mill. ધતૂરો
 232. *D. metal* Linn. સફેદ ધતૂરો
 D. fastuosa Linn.
 D. fastuosa var. *alba* Clarke
 233. *Lycopersicon esculentum* Mill. ટામેટી
 234. *Nicotiana tabacum* Linn. તમાકુ
 235. *Physalis minima* Linn. પોપડી
 236. *Solanum nigrum* Linn. પીલુદી
 237. *S. melongena* Linn. રીંઝણી
 238. *S. xanthocarpum* Schrad. ભોંયરીંઝણી
 239. *Withania somnifera* Dunn. ઘોડાકુત, અશ્વત્થા

Scrophulariaceae

240. *Bacopa monnieri* (Linn.) Pennell. ખામ, જલનેવરી
 Moniera cuneifolia Michaux.
 241. *Dopatrium junceum* (Roxb.) Buch-Ham.
 242. *Glossostigma diandra* (Linn.) O.K.
 G. spathulatum W. & A.
 243. *Lindernia ciliata* (Colsm.) Penn.
 Bonnaya brachiata Link.
 244. *L. crustacea* (Linn.) F. Mueller
 Vandellia crustacea Bth.
 245. *L. oppositifolia* (Retz.) Muk.
 Bonnaya oppositifolia Spreng.
 246. *Scoparia dulcis* Linn.

247. *Stemodia viscosa* Roxb. મુકમુની
248. *Striga densiflora* Bth. આંબિયો
249. *S. gesneroides* (Willd.) Vatke રાતો આંબિયો
S. orobanchioides Bth.

Orobanchaceae

250. *Orobanche cernua* Loebl. વાકુરબા

Lentibulariaceae

251. *Utricularia stellaris* L. f. અર્ક-ઝવર, હતિપણું

Bignoniaceae

252. *Kigelia aethiopica* Decne. ખોટી પાટલા
K. pinnata DC.

Pedaliaceae

253. *Pedaliium murex* Linn. ઊભા ગોખરુ
254. *Sesamum indicum* Linn. તથ

Martyniaceae

255. *Martynia annua* Linn. વીંછુડો
M. diandra Glox.

Acanthaceae

256. *Blepharis maderaspatensis* (Linn.) Roth ઉટિંગલુ
B. boerhaviaefolia Pers.
257. *B. molluginifolia* Pers. ઝીલુકુ ઉટિંગલુ
258. *Barleria prionitis* Linn. કાંટાશીંગણો
259. *Dipteracanthus prostratus* (Poir.) Nees કાળી કામલુ
Ruellia prostrata Poir.
260. *Elytraria acaulis* (Linn. f.) Lindau. શતમૂલી
Tubiflora acaulis O. K.
261. *Hygrophila auriculata* (Schumach.) Heine એખરો
Asteracantha longifolia Nees
262. *Justicia procumbens* Linn. ખડસલીઓ, પિતપાપડો
263. *J. simplex* D. Don.
264. *Peristrophe bicalyculata* પોપટી, કાળી અંબેડી
(Retz.) Nees

Verbenaceae

265. *Clerodendrum inerme* Gaertn. વિલાયતી મેંદી
266. *C. phlomidis* Linn. f. અરણી
267. *Lantana camara* Linn. var. *aculeata* Mold. બનેરી

268. *Phyla nodiflora* (Linn.) Greene
Lippia nodiflora Mich.

રતવેલિયો

269. *Vitex negundo* Linn.

નગેળ

Labiatae

270. *Anisomeles indica* (Linn.) O. K.
A. *ovata* R. Br.

ચોધારો, ગોપાળી

271. *Hyptis suaveolens* Poit.

272. *Leucas aspera* (Willd.) Spreng.

ફૂબો

273. *Leonotis nepetifolia* (Linn.) R. Br.

274. *Moschosma polystachyum* (Linn.) Bth.

આવચી, આવચી

275. *Ocimum americanum* Linn.

આવચી, રાતગુલસી

O. canum Sims.

Nyctaginaceae

276. *Boerhavia chinensis* (Linn.) Druce
B. *repanda* Willd.

મેટો સારોડો

277. *B. diffusa* Linn.

નાનો સારોડો

Amarantaceae

278. *Achyranthes aspera* Linn.

અધેડો

279. *Aerva lanata* Juss.

ગોરખગાંજો

280. *Alternanthera pungens* H. B. K.

281. *A. sessilis* (Linn.) R. Br.
A. *triandra* Lam.

જલનંબો, પાણીની ભાજી

282. *Amaranthus gracilis* Desf.

દીંબડો

A. *viridis* Hook. f. p. p.

283. *A. spinosus* Linn.

કાંટાળો દીંબડો

284. *Celosia argentea* Linn.

લાંપડી

285. *Digera muricata* (Linn.) Mart.

કલ્પેજરો

D. *arvensis* Fork.

286. *Gomphrena celosioides* Mart.

287. *Pupalia lappacea* Moq.

ત્રીપટો

Chenopodiaceae

288. *Chenopodium album* Linn.

ચીસતી ભાજી

Polygonaceae

289. *Polygonum plebejum* R. Br.

ત્રીજુકો ઓખરાડ

Euphorbiaceae

290. *Croton bonplandianum* Baill

C. *sparsiflorus* Morung.

291. *Chrosophora plicata* A. Juss. ધર્મવર્તી ઝોખરાડ
 292. *C. prostrata* Daiz બેઠો ઝોખરાડ
 293. *Emblca officinalis* Geartn. આખળાં
Phyllanthus emblica Linn.
 294. *Euphorbia dracunculoides* Lam.
 295. *E. heterophylla* Linn.
 296. *E. nivulia* B. Ham. ઘોર
 297. *E. pilulifera* Linn. નામલા દુધેલી
E. hirta Linn.
 298. *Euphorbia tirucalli* Linn. ખરમાણી
 299. *E. thymifolia* Linn. નાની દુધેલી
 300. *Kirgenelia reticulata* (Poir.) Baill. કમોઈ
Phyllanthus reticulatus Poir.
 301. *Phyllanthus fraternus* Webs. ભોંચ આમલી
P. niruri Senu HK. f.
 302. *P. simplex* Retz મોટી ભોંચ આમલી
 303. *Ricinus communis* Linn. ઝેરડો
 304. *Securinega virosa* (Roxb. ex. Willd.). શીવણી હુમરી
 Pax & Hoffm.
Fluggea microcarpa Blume

Ulmaceae

305. *Holoptelea integrefolia* (Roxb.) Planch. કચ્છ

Moraceae

306. *Ficus bengalensis* Linn. વડ
 307. *F. glomerata* Roxb. ઉમરડો, ઉંખરો
 308. *F. religiosa* Linn. પીપળો
 309. *F. retusa* Linn. પીપળ
 310. *Streblus asper* Lour. સરેશ

Hydrocharitaceae

311. *Hydrilla verticillata* Royle

Liliaceae

312. *Asparagus gonoclados* Baker મોટી સતાવરી
 313. *A. racemosus* Willd var. *javanica* Baker સતાવરી
 314. *Aspodelus tenuifolius* Cav. કુમરુ
 15. *Gloriosa superba* Linn. વડવાડિયું

Commelinaceae

316. *Commelina benghalensis* Linn.
 317. *C. diffusa* Burman
C. nudiflora Linn.
 318. *C. forskalaei* Vahl
 319. *Murdannia semiteres* (Daiz.) Sant.
Aneilema paniculatum Wt.

મોડુ' યીસ જુલિયુ'
 સિસમૂજી

Lemnaceae

320. *Lemna* sp.

પાંદડીલી

Cyperaceae

321. *Cyperus bulbosus* Vahl
 322. *C. flavidus* Linn.
 323. *Cyperus iria* Linn.
 324. *C. pygmaeus* Rottb.
 325. *C. rotundus* Linn.
 326. *C. triceps* Endl.
Kyllinga triceps Rottb.
 327. *Fimbristylis dichotoma* Vahl

નાગરમેથ

Gramineae

328. *Apluda mutica* Linn.
 329. *Aristida adsenscionis* Linn.
 330. *Brachiaria ramosa* (Linn.) Stapf
 331. *Cenchrus biflorus* Roxb.
 332. *C. ciliaris* Linn.
 333. *Chloris barbata* Sw.
 334. *Cynodon dactylon* (Linn.) Pers.
 335. *Cymbopogon martinii* (Roxb.) Wats
 336. *Dactyloctenium aegyptiaca* (Linn.) P. Beauv.
 337. *Desmostachys bipinnata* (Linn.) Stapf
 338. *Digitaria adscendens* (HBK.) Stapf
 339. *Dichanthium annulatum* (Forsk.) Stapf
 340. *Echinochloa colonum* (Linn.) Link.
 341. *Eleusine indica* (Linn.) Gaertn.
 342. *Eragrostis ciliaris* (Linn.) R. Br.
 343. *E. tremula* Hochst.
 344. *E. unioloides* (Retz.) Nees

ગાંધી

ઉડલાંપડે

જામણ

મીંદડિયુ' ધાસ

ધરે

આરોતારો

અડલાસ નામલી

મરમર ધાસ

345. *Hachelochloa granularis* (Linn.) O. K.
346. *Heteropogon contortus* (Linn.) P. Beauv.
347. *Ischaemum rugosus* Salisb.
348. *Melanocenchris jacquemontii*
Jaub. et. Spach.
349. *Oryza rufipogon* Griff. અડધાઉંડી ડાંગર
350. *Panicum psilopodium* Trin
351. *Paspalidium flavidum* (Retz.) A. Camus. ઝીણુકો સામે
352. *Paspalum scrobiculatum* Linn. ઢાંદરા
353. *Perotis indica* (Linn.) O. K.
354. *Saccharum spontaneum* Linn. ઘાસ, કાંચ
355. *Setaria glauca* Beauv.
356. *S. verticillata* (Linn.) P. Beauv. મોટી ફૂંચી
357. *Sporobolus coromandelianus* Retz.

Summary

The flowering plants of Vallabh Vidyanagar and its environs are enumerated here. In all about 357 plants have been listed of which 310 are dicotyledons and 47 monocotyledons. There are some plants eg. *Acanthospermum hispidum* DC., *Croton bonpladianum* Baill., *Gardenia turgida* Roxb., *Glossostigma diandra* O. K. etc. are not indigenous and seem to have become naturalized in this area.

Acknowledgements

The authors are greatly indebted to Dr. G. L. Shah for encouragements, valuable suggestions and guidance. Our thanks are also due to Dr. J. J. Shah for giving encouragement and to Shri A. J. Dave for his kind help.

References

1. Blatter, E. J. and C. McCann (1935)
The Bombay Grasses. New Delhi.
The Imperial Council of Agri., Res.
New Delhi.
2. Bor N. L. (1960)
Grasses of Burma, Ceylon, India and
Pakistan (Excluding Bambuseae) London.

3. Chavan A. R. & S. N. Padte (1960)
Contribution to the flora of Savli Taluka.
Ind. For. 86(4): 210-219.
4. Chavan A. R. & S. D. Sabnis (1961)
A study of the hydrophytes of Baroda
and its environs.
Jour. Ind. Bot. Soc. 40(1): 121-130.
5. Cooke T. (1901-1908)
Flora of Bombay Presidency, London.
6. Hooker J. D. et al. (1872-1897)
The flora of British India, London.
7. Jaikrishan Indrajai (1910)
Vanaspati Shastra.
8. Jaikrishan Indrajai (1921) 'Kuchni Jadibuthi'.
9. Pathak V. G. & G. M. Oza (1957)
Studies on the weeds of Gujarat-I. Obser-
vations on the weeds of the M. S. Uni.
Campus.
Jour. M. S. Uni. Baroda. 6(2): 92-111.
10. Raizada M. B. (1958)
Name changes in common Indian Plants.
Ind. For. Rec. Vols. 5: 467-538.
No. 1. Reprinted from The Ind. For.
84(8): 467-538.
11. Santapau H. (1954-1955)
Contribution to the Botany of Dangs Forest.
Jour. Guj. Res. Soc. 16: 204-320, 1954.
Jour. Guj Res. Soc. 17: 1-59, 1955.
12. Shah G. L. (1963)
Contribution to the vegetation of Baroda.
Ind. For. 89(4): 286-290.
13. Saxton W. T. & L. J. Sedgwick. (1918)
Plants of Northern Gujarat.
Rec. Bot Surv. India. 6 (70): 209-323.

FURTHER CONTRIBUTION TO THE FLORA OF GUJARAT STATE

G. L. SHAH and J. A. INAMDAR

*Department of Botany,
Sardar Patel University, Vallabh Vidyanagar*

Abstract

The present paper deals with the information about fifteen plants collected from different parts of Gujarat. The information is first hand and in most cases different from that published earlier. Five plants are new to Gujarat.

Introduction

Since independence the importance of the revision of provincial floras has been stressed by the leading botanists of the country (see Santapau 1958, 1962). The flora of different areas should be studied intensively to achieve this goal. Though of late, some work is done in this direction, there are many provinces which need to be botanically explored. Gujarat is one of such provinces whose many parts are still unexplored. As a part of erstwhile Bombay Presidency, it had been neglected by the botanists of that time. In a cursory reference to Cooke's Flora (1958), one will find only a few localities cited from Gujarat.

The intensive exploration of different parts of Gujarat should be undertaken and the plants collected from different areas should be critically examined for the following reasons: (1) It is likely that many plants new to Gujarat may be discovered. (2) Additional localities for the distribution of a number of plants will be known, especially for those believed to be rare. (3) The information of the exact localities of the plants, their relative abundance, flowering and fruiting time, habit and habitat of the plants etc., may be helpful in utilizing the plants on commercial basis when they have been found

economically useful. (4) During the critical examination of the plants it is necessary to compare ones observations with those given in the published literature dealing with the flora of different parts of Gujarat, and to note variation if any. A report on the variations in the plants will be of taxonomical value at the time of revision of the flora

During the botanical exploration in some of the parts of Gujarat e.g. Vallabh Vidyanagar, Vasad, Cambay, Baroda, Pavagadh and Dang's Forests, the authors came across some plants that are new to Gujarat. They are *Acrocephalus indicus* (Burm.) O. Kuntze, *Croton bonplandianum* Baill., *Ipomoea triloba* Linn., *Physalis longifolia* Nutt., *Plantago psyllium* Linn. and *Senecio grahami* Hook. f. The occurrence of *Acrocephalus indicus* O. Kuntze and *Plantago psyllium* Linn. is reported by *Santapau & Shah and *Chohan & Shah respectively hence they are not mentioned in the text. *Cynoctonum mitreola* (L.) Britt., so far, is a rare plant, only found at Lunawada and Pavagadh. In a critical examination of plants collected from these areas, it was found that in many cases our observations were different from those already published. In view of this it was thought worthwhile to record all such information in this paper, and it is hoped, it will serve in time for the revision of the flora of Gujarat State.

The nomenclature of some of the plants is the same as that given in Cooke's flora; where the name is changed, the first name, according to us, is correct, the name in Cooke's flora, then, is given as a synonym.

For most plants we give our collection number. All the herbarium sheets referred to in this paper are deposited in Herbarium of the Botany Department, Sardar Patel University, Vallabh Vidyanagar. For the sake of brevity, the descriptions have been omitted. The information given here is first hand, based on extensive collections made, and ample field notes taken during the outings. As far as the authors are aware, it is not published earlier in the floras of the different parts of Gujarat.

OBSERVATIONS

Rhamnaceae1. *Zizyphus glabrata* Heyne ex Roth*Zizyphus trinervia* Roxb.

Cooke (1:256) and Santapau (1962, p. 92) describe this plant as unarmed; further Cooke cites only Ahmedabad and Surat as localities for its distribution. Saxton and Sedgwick (1918, p. 253) also list it from Ahmedabad on the strength of Mr. Bhide's Collection, but they themselves failed to locate it from any part of North Gujarat, during their botanical exploration. As a result, the later author (1919) expressed the view that it should be excluded from the future floras as it is not indigenous in the Presidency.

In light of these reports one of us (*Shah*) carefully noted its distribution in different areas explored and examined as many plants as possible. It was collected from Vallabh Vidyanagar (*Shah* 11370), Boroda (*Shah* 6480), Broach (*Shah* 6300) and from Cambay (noted on 4-10-1964). In these areas it is occasionally found. Santapau (1954, p. 308) also found it in waste lands at Unai, Dangs forest, where, according to him, it is common. In the Blatter Herbarium there are several sheets of it from Kutch, Saurashtra, and Dangs forest. In the authors' opinion, therefore, the view of Sedgwick cannot be maintained. Further all the plants collected by us and almost all those in the Blatter Herbarium are spiny. The greyish-white, smooth bark, the bright green, glabrous leaves with serrate margins and the straight conical spines are rather typical of this plant.

Papilionaceae2. *Aeschynomene indica* Linn.

According to Cooke (1:363) it is 1'-3' (30-90 cm.) tall. In our experience the plant is extremely variable regarding its habit; along margins of water-logged soil it is diffuse, branches at times floating in water; in dense vegetation it is erect, 30-45 found to be 4'-6' (about 120-180 cm.) tall, growing in a dense cm. tall. On 23-12-1963, for the first time the plant was patch in a drying ditch at Ahwa, Dangs Forest (*Shah* 10703).

The plant was quite conspicuous by its height. At first sight it may be mistaken for *Aeschynomene aspera* Linn. and *Sesbania bispinosa* (Jacq.) F. & R. In fact Santapau (1954, p. 311) describes *Aeschynomene aspera* Linn. from Dangs Forest as "3' to 5' tall, in some fields very dense, in almost pure stands, erect or suberect." We have examined the sheets of this plant, collected by Santapau from Dangs, and they are *A. indica* Linn. The pods of *A. aspera* Linn. are stouter, broader and longer than those of *A. indica* Linn. In the Blatter Herbarium there are only a few sheets of the former plant, whereas several of the latter, collected from many parts of erstwhile Bombay State. The plants of such unusual heights have also been noted on a few occasions, growing in dense patches, in cultivated fields in vicinity of Vallabh Vidyanagar. Santapau (1962, p. 144) describes the height of the present plant 40-90 cm.; however, in the foot note he also reports plants growing near hedges in Sasan, up to 2 m. high.

3. *Tephrosia strigosa* (Dalz.) Sant. and Mahesh.

Tephrosia tenuis Wall.

The authors collected this plant from Baroda (*Shah* 630) on 12-9-1954 and noted the flowers bluish-purple. Phatak & Oza (1957) reported the colour of the flowers yellow, for the plants collected from Baroda between August and October. This report on the variation in the colour of the flowers prompted us to note it at different times in the flowering season of as many plants as possible during the outings in different parts of Gujarat and in the areas in vicinity of Bombay. In all the plants examined the colour was invariably blue or bluish-purple. In no case plants with yellow flowers were seen; further the colour change from 'blue to yellow on fading' as mentioned by Cooke, was also not noted. In order to confirm our observations we also examined all the sheets of this species (there are several) in the Blatter Herbarium, collected from Saurashtra, Baroda, Broach, Bombay and occasional ones from Nishannagar (U.P.), Jodhpur and Andhra and carefully noted the remarks there on. Many sheets bear the remarks, "flowers blue or bluish-

purple" whereas occasional ones indicate 'violet flowers' but never yellow. According to Nairne (1894), Gamble (1957) and Santapau (1962, p. 134) also the colour of the flowers is purple, pink and blue or bluish-purple respectively. None of these authors mention yellow flowers even as a rarity. As far as the authors are aware, in vicinity of Bombay the only plant with yellow flowers in the genus *Tephrosia* is *T. pauciflora* Grah. Here also the unopened flowers are pale yellow, but the fully open flowers are pale to bright purple. From this it will be clear that if the flowers are yellow they are extremely rare. However, it will be worthwhile to make many more field observations in various localities to find out if there are plants with yellow flowers and that this is a constant character. If it is so, it may be a new variety.

Rubiaceae

4. *Gardenia turgida* Roxb. var. *montana* Hook.f.

The only record of its occurrence in Gujarat seems to be that of Saxton (1922, p. 254) who lists it in his plants of North Gujarat without reference to any locality. The author remarks, "Rare, and not yet seen in flower or fruit". In vicinity of Vallabh Vidyanagar, it is occasionally found in hedges along cultivated fields. It flowers in the month of April. Flowers are pale yellow or creamy. We collected the fruits in June 1965 (*Shah* 11406). There is also one sheet of it with flowers in the Blatter Herbarium (without number) collected from Anand by Principal Chohan in June 1957. Locally the plant is known as *Gangdi*.

5. *Oldenlandia herbacea* (L.) Roxb.

Chavan and his students (1960) who have explored the flora of Baroda and its neighbourhood do not report the occurrence of this and the following species of *Oldenlandia*. They have also not been reported by any other worker from Gujarat except by Santapau (1962, pp. 263-64).

Occasional in moist ground along margins of temporary ditches at Baroda (*Shah* 6420). Flowers white.

6. *Oldenlandia pumila* (L.f.) DC.*Oldenlandia crystallina* Roxb.

This species was noted along with the previous one at Baroda (Shah 6437); occasional, flowers white.

7. *Oldenlandia umbellata* Linn.

On 14-10-1963, the authors came across a few plants growing among short grasses in Gujarat College Campus, Ahmedabad. At the first sight it looked some what different from *O. corymbosa* Linn.; hence available material was collected to examine it critically. On examination it was found to be *O. umbellata* Linn. (Shah 10663). Our sheets also match with those in the Blatter Herbarium. Several authors (Vaidya, B. S. & Vora, 1964) have contributed to the flora of Ahmedabad; none seems to have listed it from the present locality. In Gujarat College Herbarium also there are no sheets of it.

Compositae8. *Senecio grahami* Hook. f.

This is one of the conspicuous plants in the latter half of monsoon by its bright yellow flowers. It is found on hilly slopes at Pavagadh, scattered or mixed with *Linum mysorense* Heyne (Shah 11062).

Loganiaceae9. *Cynoctonum mitreola* (L.) Britt.*Mitreola oldenlandioides* Wall.

A tiny herb, 15-45 cm. tall, commonly found in the undergrowth of dense and often impenetrable vegetation. Flowers white. Saxton (1922, p. 255) seems to be the only person to list it from Gujarat: *Lunawada*. Recently the authors also collected it from Pavagadh, where only 4-5 plants were seen growing among dense grasses on stony ground. For the nomenclature of this plant see Shah (1962).

Convolvulaceae10. *Ipomea triloba* Linn.

It is a common twiner on hedges. The corolla is only 1.5-1.75 cm. long. The occurrence of this plant in the erstwhile

Bombay state was first reported by Fernandez, Randeria & Santapau (1955), on the basis of plants collected in the neighbourhood of Bombay. At present it seems to be restricted in its distribution, only found in vicinity of Bombay and in Gujarat at Waghai, Dangs Forest, *(Santapau & Shah) and Vallabh Vidyanagar (Shah 11103).

Solanaceae

11. *Lycium barbarum* Linn.

Clarke (1883) considered *Lycium barbarum* Linn. and *L. europaeum* Linn. distinct. Under *L. barbarum* Linn., however, he remarks on page 241 "This is not *L. barbarum* Linn., as understood by Dunal (in DC. Prodr. xiii pt. i. 511); but it is doubtful whether either of these two ought to be separated specifically from *L. europaeum* Linn. According to Cooke (2:342) *L. barbarum* Linn. is "a variable plant as regards arrangement, size, and shape of leaves, length of corolla and relative lengths of corolla tube and the lobes. It seems to be hardly separable from *L. europaeum* Linn." On the other hand Santapau (1953) considers *L. barbarum* Linn. and *L. europaeum* Linn. distinct. This is why we experienced some difficulty in the identification of our plants. Our plant agrees with the description of *L. barbarum* Linn. given by Cooke and we follow him. Cooke gives the only locality Porbander (Kathiawar) in Gujarat, without any reference to its relative abundance. Saxton & Sedgwick (p. 284) describe it "Kharaghoda, in a hedge. Only one plant seen." At Cambay this is a fairly common plant, scattered or subgregarious, on mud flats along seashore (Shah 10934). In open ground it is bushy, 40-90 cm. tall, in hedges 1.5-2 m. high. Saxton & Sedgwick and Cooke give the flowering time October and November respectively. We found it profusely flowering and fruiting in the beginning of September (4-9-1964). The flowers at first are white, pale-brown on drying.

12. *Physalis longifolia* Nutt.

This is an American plant, found in vicinity of Bombay. It has also been reported from Andhra, and Kerala. Its occur-

rence in Gujarat is recorded here for the first time, on the basis of a few plants found at Cambay (Shah 10944-A) on mud flats along seashore. It is often confused with *Physalis minima* Linn. which is also a common weed in many parts of Gujarat. For a key to the two species see Santapau, Shah & Kapadia (1961).

Scrophulariaceae

13. *Glossostigma diandra* (L.) O. Kuntze

Glossostigma spathulatum W. & A.

Postrate herbs with spatulate leaves and minute white flowers, found in moist ground. Apparently it resembles *Dentella repens* Forst. which is also found in similar habitat. The only locality, so far known, for the distribution of this plant in Gujarat is Talod (Saxton & Sedgwick, p. 285), where it is found on sandy edges of a tank. To this we add locality, Vallabh Vidyanagar (Shah 10820), where the plant is occasional, at times in loose patches, in cultivated fields. The flowering season according to Cooke (2 : 371) is November where as Saxton & Sedgwick and Santapau (1960) state it is October. In our area it was profusely flowering and fruiting by the middle of August.

Acanthaceae

14. *Gantelbua urens* (Heyne ex Roth) Bremek.

Hemigraphis dura T. Anders.

This is an interesting plant from the point of nomenclature. Santapau (1952) has discussed it at length. As to its distribution in Gujarat, so far, it is found in some of the parts of Southern Gujarat only e.g. Surat (Cooke 2:433), Bilimora (Santapau 1955, p. 37), Broach (Shah 1964). It is common, often in dense patches, in drying ditches and cultivated fields along railway lines. In vicinity of Broach it is abundant at some places, conspicuous by the bright-pink or violet-purple flowers. According to Cooke and Santapau the flowers are blue and sky-blue respectively. This may be due to a change in colour of the flowers, which when fresh are bright-pink or violet-purple, with age becoming blue or sky blue. Similar change in colour of

the flowers is also seen in some plants like *Alysicarpus hamosus* Edgew., *A. vaginalis* DC., *Desmodium gangeticum* Linn., etc. Here the fresh flowers are violet or purple, changing to light blue with an advance in age.

Euphorbiaceae

15. *Croton bonplandianum* Baill.

Croton sparsiflorus Morung.

This is an introduction from South America. The plant is fairly naturalized in many parts of India. It has been described by several authors such as *Haines* (1960), *Mayurnathan* (1929), *Tadulingam & Venkatanarayana* (1955), under *C. sparsiflorus* and *Mirashi* (1962) under *C. bonplandianum*. *Croizat* in *J. Bombay nat. Hist. Soc.* 41 : 573, 1940 gives several localities for its distribution in many parts of India but none from erstwhile Bombay State. One of us (*Shah*)* who collected it from Karjat reported its occurrence for erstwhile Bombay State. In Gujarat, the plant is recorded for the first time. The authors collected it from the University Campus (*Shah* 10815) where it is fairly common, often in patches, in waste places along road sides.

Aknowledgements

The authors are thankful to Prof. P. V. Bole for facilities to work in the Blatter Herbarium, Bombay-1.

References

- Chavan, A. R. & Padte, S. N.* (1960) Contribution to the flora of Savli Taluka. *Indian For.* 86 : 210-219.
- _____ & *Sabnis, S. D.* (1960) Along the banks of the river Vishwamitri (A floristic study). *Ibid.* 86 : 469-474.
- * *Chohan, J. G. & Shah, G. L.* On the occurrence of *Plantago psyllum* Linn. in Gujarat. *J. Bombay nat. Hist. Soc.* (in Press).
- Clarke, C. B.* (1883) Solanaceae in Sir J. D. Hooker's *The Flora of British India*, London, pp. 240-241.
- Cooke, Th.* (1953) *The Flora of the Presidency of Bombay*. Reprinted ed. Calcutta.

Fernandes, R. R., Randeria, A. & Santapau, H. (1955) New plant records for Bombay. *J. Bombay nat. Hist. Soc.* 52: 661.

Gamble, J. S. (1957) *Flora of the Presidency of Madras*. Reprinted ed. Calcutta, p. 224.

Haines, H. H. (1961) *The Botany of Bihar and Orissa*. Reprinted ed. Calcutta, 1: 109.

Mayurnathan, P. V. (1929) The flowering plants of Madras City and its immediate neighbourhood. *Bull. Madras Govt. Mus. N. S. nat. Hist. sect.* 2: 267, t. 31(D).

Mirashi, M. V. (1962) Some new plant records for Nagpur-III. *Bull. bot. Soc. Coll. Sci. Nagpur* 3: 30.

Nairne, A. K. (1894) *The flowering plants of Western India*. Bombay and London, p. 80.

Phatak, V. G. & Oza, G. M. (1957) Studies on the weeds of Gujarat. Observations on the M. S. University Campus. *J. M. S. Uni. Baroda* 6: 107.

Santapau, H. (1952) The Acanthaceae of Bombay. *Uni. Bombay bot. Mem.* 2: 28.

_____ (1953) Plants of Saurashtra a preliminary list. *Saurashtra Res. Soc. Monogr.* No. 1, p. 27.

_____ (1954-1955) Contribution to the botany of the Dangs Forest, Bombay state. *J. Gujarat Res. Soc.* 16(4): 285-320, 1954 & 17: 1-59, 1955.

_____ (1958) Floristic studies in India. *Mem. Indian bot. Soc.* No. 1(3): 117-121.

_____ (1960) The Flora of Khandala on the Western Ghats of India. 2nd edition. *Rec. bot. Surv. India* 16(1): 291.

_____ (1962) The present state of taxonomy and floristics in India after Independence. *Bull. bot. Surv. India* 4: 209-215.

• _____ & Shah, G. L. Further contributions to the Botany of Dangs Forest, Gujarat State. *J. Bombay nat. Hist. Soc.* (in Press).

_____ & Mrs. Kapadia, Z. (1961) New plant records for Bombay. *Physalis longifolia* Nutt. *Ibid.* 58: 550-551.

Santen, W. T. (1922) Additional notes on plants of Northern Gujarat. *Rec. bot. Surv. India* 9: 251-262.

- _____ & Sedgwick, L. J. (1919).....Plants of Northern Gujarat.
Ibid. 6 : 207-323, 1-xiii, map.
- Sedgwick, L. J. (1919) On the species of *Zizyphus* in the Bombay
Presidency. *Indian For.* 45: 70.
- Shah, G. L. (1962) Name changes of some common Bombay plants.
J. Uni. Bombay 30 : 35.
- _____ (1964)..... Enumeration of plants from Broach-II, 'Vidya',
J. Gujarat Uni. 7 : 177.
- _____ A note on exotic weeds of Bombay, sent to *J. Uni.*
Bombay for publication.
- Tadulingam, C. & Venkatanarayana, G. (1955)..... A hand-book of some
South Indian weeds _____ Madras,
p. 398, t. 160.
- Vaidya, B. S. & Vora, A. B. (1964)..... Some new records of Angiosperms
for Ahmedabad, 'Vidya', *J. Gujarat Uni.* 7 : 196.

FORMULAE SIMILAR TO FRENET'S FORMULAE FOR THE CURVATURES OF A CONGRUENCE WITH RESPECT TO A CURVE

DARSHAN SINGH
Department of Mathematics
Gujarat University, Ahmedabad-9

A generalisation of Frenet's formulae for a curve in an n dimensional Riemannian Space V_n was given by Blaschke, W. (1920). It is available in almost all the standard books on Riemannian Geometry.

The purpose of the present note is to develop formulae, similar to Frenet's formulae, regarding curvatures of a congruence with respect to a curve.

Let v be the unit vector field in V_n touching a congruence (v) . Let C be a curve in V_n and s the arc length along it. Then the derived vector $\delta v / \delta s$ of the vector field along C is called the curvature vector of the congruence (v) with respect to C . We have called it the first curvature vector of the congruence (v) with respect to C . This vector is normal to v . Denoting its magnitude as κ_1 it can be written as

$$\frac{\delta v}{\delta s} = \kappa_1 n_1 \quad (1)$$

where n_1 is the unit vector along it and is called the unit principal normal of (v) with respect to C . Next consider the derived vector of n_1 along the curve.

Resolve it into a component perpendicular to v and n_1 , and a component in the subspace spanned by v and n_1 . Denoting the former by $\kappa_2 n_2$, where κ_2 is its magnitude and n_2 the unit vector in the direction, and noting that the derived vector of n_1 will be perpendicular to n_1 ,

$$\frac{\delta n_1}{\delta s} = \kappa_2 n_2 + c v .$$

As v is perpendicular to n_1 , $c = -\nu K_1$. Thus

$$\frac{\delta n_1}{\delta s} = \nu K_2 n_2 - \nu K_1 v \quad (2)$$

νK_2 will be called the second curvature of (v) with respect to C .

Similarly let us resolve the derived vector of n_2 along C into a component perpendicular to v , n_1 and n_2 and another component expressible in terms of v , n_1 and n_2 . It can be easily seen that the direction of the latter component will be that of n_1 because v is perpendicular to n_1 and the derived vector of n_2 is perpendicular to n_2 . Also the projection of $\delta n_2 / \delta s$ on n_1 is

$$n_1 \cdot \frac{\delta n_2}{\delta s} = -n_2 \cdot \frac{\delta n_1}{\delta s} = -\nu K_2$$

Denoting the former component by $\nu K_3 n_3$, where n_3 is the unit vector in the direction of this component,

$$\frac{\delta n_2}{\delta s} = \nu K_3 n_3 - \nu K_2 n_1 \quad (3)$$

νK_3 will be called the third curvature of (v) with respect to C .

Proceeding like this, defining the r th curvature of (v) with respect to C in a similar manner and denoting this r th curvature by νK_r one can get,

$$\frac{\delta n_h}{\delta s} = \nu K_{h+1} n_{h+1} - \nu K_h n_{h-1} \quad (4)$$

for $h = 2, 3, \dots, n-2$ provided none of the K 's entering in the formulae is zero.

Lastly we get

$$\frac{\delta n_{n-1}}{\delta s} = -\nu K_{n-1} n_{n-2} \quad (5)$$

since the vector n_{n-1} completes the orthogonal ennuple of v , n_1, \dots, n_{n-1} in V_n .

Formulae (1), (2), (3), (4) and (5) are the required formulae. If C is a curve of the congruence (v) then these formulae become Frenet's formulae for the curve.

Reference

Blaschke, W: Frenets Formeln für den Raum von Riemann. Math. Zeit. 6 (1920), 94-99.

COMPOUND PENDULUM : SOME RESULTS

M. D. TRIVEDI

*Sheth M. N. Science and Shri and Shrimati P. K. Kotawala Arts College,
Patan. (N G.)*

and

M. S. MEHTA

*Str P. T. Science College and Shri S. K. Shah and
Shri Krishna O. M. Arts College, Modasa*

1. Introduction :

It is known that in the case of rigid body used as a compound pendulum, there will be some points about which periodic times are equal. Freeman¹ has worked with a rectangular lamina and Bhatt and Bhatt² have worked with elliptical lamina and a right circular cylinder. They kept one of the dimensions of the rigid body constant and varied the other dimension and studied the variations in periodic time about some selected points. In what follows we give the results for lamina in the form of (1) Two isosceles triangles joined base to base, and (2) a rectangle to which isosceles triangles are attached.

Case 1 :

The moment of inertia of a plane lamina in the form of two isosceles triangles joined base to base about an axis passing through the edge of the diagonal of length $2b$ perpendicular to the plane of lamina is,

$$\frac{M}{6} (h^2 + 7b^2)$$

where h = Altitude of each triangle,
and $2b$ = Base of each triangle,
the corresponding period of oscillation,

$$T_a = 2\pi \sqrt{\frac{M(h^2 + 7b^2)}{6Mgb}} = 2\pi \sqrt{\frac{h}{6g} \left(n + \frac{7}{n} \right)} = 2\pi \sqrt{\frac{h}{6g}} \cdot Fa \dots (1)$$

$$\text{where, } n = \frac{h}{b} \text{ and } Fa = n + \frac{7}{n} \dots (2)$$

Similarly the period of oscillation about an axis passing through the edge of the diagonal $2h$ of the triangles and per-

pendicular to plane of lamina is,

$$T_b = 2\pi \sqrt{\frac{h}{6g} \left(7 + \frac{1}{n^2} \right)} = 2\pi \sqrt{\frac{h}{6g} \cdot F_b} \quad \dots (3)$$

$$\text{where, } n = \frac{h}{b} \text{ and } F_b = 7 + \frac{1}{n^2} \quad \dots (4)$$

Hence from (1) and (3) the condition for equal periods ($T_a = T_b$) is given below:

$$n + \frac{7}{n} = 7 + \frac{1}{n^3}$$

$$\text{i.e. } n^3 - 7n^2 + 7n - 1 = 0 \quad \dots (5)$$

Equation (5) is of the cubic form whose roots are 1, $3+2\sqrt{2}$ and $3-2\sqrt{2}$, the later two roots being reciprocal of each other. We have $n=1$ and 5.825 as the ratios to give equal periods.

To get condition for minimum period, we differentiate equation (2) and equate it to zero.

$$\frac{d}{dn} \left(n + \frac{7}{n} \right) = 0$$

$$\text{i.e. } 1 - \frac{7}{n^2} = 0$$

$$\therefore n = \sqrt{7} = 2.645$$

A rhombic plane lamina with one diagonal $2h$ and another of length $2b$ was taken. $2h$ was kept constant, of 60 cms, and $2b$ was varied to obtain the required ratios ' n '. The periods T_a and T_b were measured.

The following are the actual observations:

Ratio ' n '	T_a seconds	T_b seconds	$\sqrt{\frac{F_a}{T_a}}$	$\sqrt{\frac{F_b}{T_b}}$
1.0	1.278	1.278	2.213	2.213
1.5	1.108	1.226	2.241	2.221
2.0	1.065	1.210	2.203	2.225
2.5	1.032	1.200	2.230	2.229
3.0	1.046	1.196	2.207	2.230
4.0	1.062	1.190	2.258	2.233
5.0	1.124	1.184	2.251	2.447
6.0	1.22	1.190	2.194	2.228

From the table it is evident that \sqrt{Fa}/Ta and \sqrt{Fb}/Tb are fairly constant within experimental errors. The plot of periods (Ta and Tb), against the ratio 'n' is shown in fig. (1). The values for equal periods and for minimum period obtained

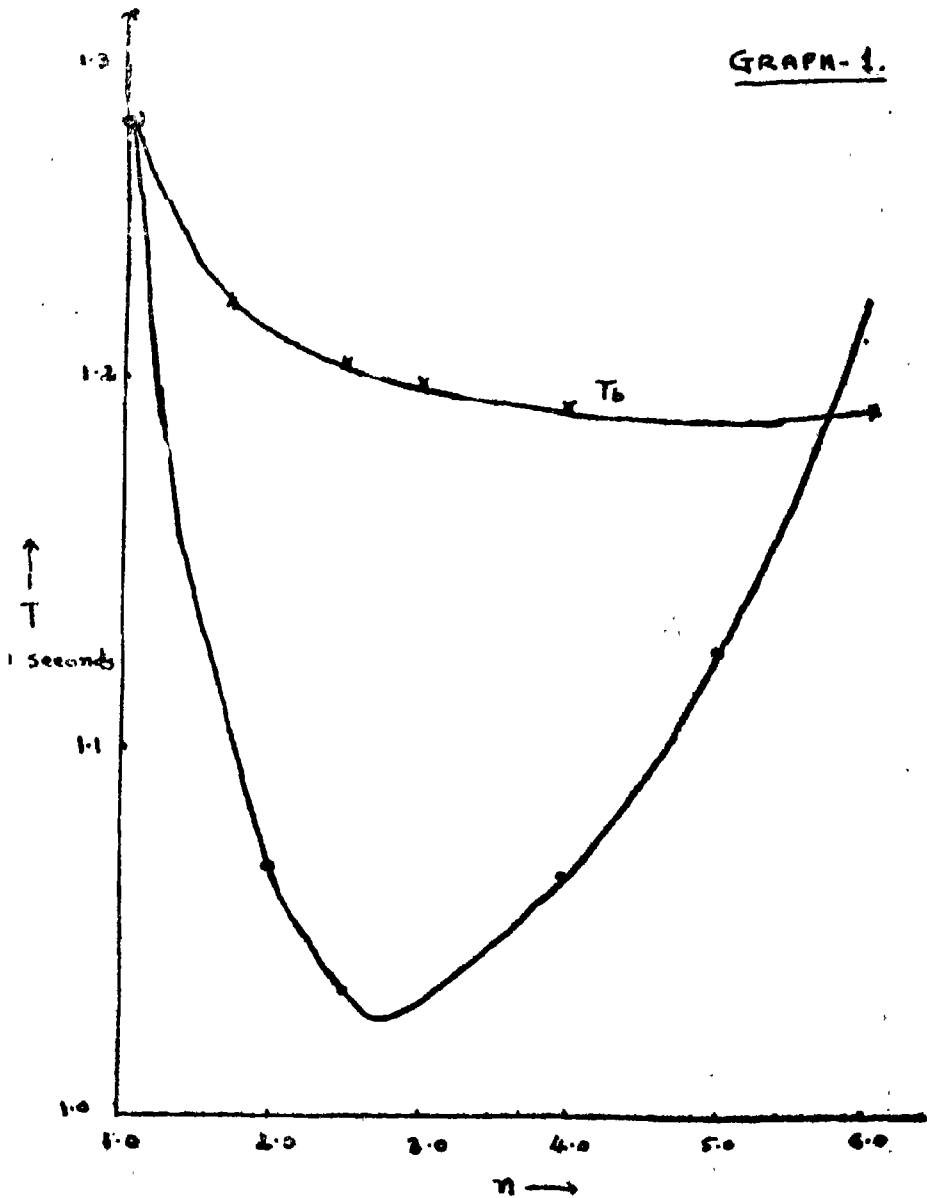


Fig. 1

from the Graph agree very well with the theoretical values as shown below :

	Theory	Experiment
Equal Periods	$n=1$ and 5.825	$n=1$ and 5.8
Minimum Periods	$n=2.645$	$n=2.7$

The value of 'g' calculated from equations (1) and (3) taking the mean value of \sqrt{Fa}/Ta and \sqrt{Fb}/Tb comes out to be 987.8 cm./sec^2 .

Case 2 :

The equal isosceles triangles with their bases equal in length to the breadth of a rectangular lamina were attached to the opposit sides of the rectangular lamina.

Let the length of the lamina be $2h$ and the altitude of each triangle be h , thus making the total length of the body $4h$, which is kept constant. The breadth $2b$ of the lamina or the base of the triangles, is varied according to the required ratio $n = h/b$.

The moment of inertia of the body about an axis passing through the edge of the vertex of either triangles and perpendicular to the planes of the lamina is given by,

$$\frac{M}{18} (87h^2 + 5b^2)$$

So that the corresponding period is given by,

$$Tb = 2\pi \sqrt{\frac{h}{36 \cdot g} \left(87 + \frac{5}{n^2} \right)} = 2\pi \left(\frac{h}{36 \cdot g} \cdot Fb \right)^{\frac{1}{2}} \quad \dots(1)$$

$$\text{where, } n = \frac{h}{b} \text{ and } Fb = 87 + \frac{5}{n^2} \quad \dots(2)$$

Similarly the moment of inertia of the body about an axis passing through the midpoint of the side of the rectangle and perpendicular to the plane of the lamina is

$$\frac{M}{18} (15h^2 + 23b^2)$$

So that the corresponding period is given by

$$Ta = 2\pi \sqrt{\frac{h}{36 \cdot g} \left(30n + \frac{46}{n} \right)} = 2\pi \left(\frac{h}{36 \cdot g} \cdot Fa \right)^{\frac{1}{2}} \quad \dots(3)$$

where $n = \frac{h}{b}$ and $Fa = 30n + \frac{46}{n}$..(4)

Hence for equal periods, from (1) and (3)

$$30n + \frac{46}{n} = 87 + \frac{5}{n^2}$$

i.e. $30n^3 - 87n^2 + 46n - 5 = 0$..(5)

The above equation is of the cubic form, its roots being

$$n = 0.5 \text{ and } \frac{18 \pm \sqrt{449}}{15}$$

Hence $n = 0.5, 2.252$ and 0.148 are the ratios for equal periods. For minimum period, differentiating (4) and equating it to zero,

$$\frac{d}{dn} \left(30n + \frac{46}{n} \right) = 0$$

i.e. $30 - \frac{46}{n^2} = 0$

$$\therefore n = \sqrt{\frac{46}{30}} = 1.235$$

In the actual experiment, the length $2h$ of the rectangular lamina was kept 30 cms. and the altitude h of each triangle was 15 cms. The breadth of the lamina and accordingly the base $2b$ of the triangles, was varied according to the required ratios.

The following table gives the actual observations :

Ratio n	Ta seconds	Tb seconds	$\sqrt{\frac{Fa}{Ta}}$	$\sqrt{\frac{Fb}{Tb}}$
0.4	1.42	1.300	7.936	7.877
0.6	1.26	1.300	7.721	7.721
1.0	1.14	1.244	7.647	7.704
1.5	1.13	1.236	7.695	7.640
2.0	1.18	1.226	7.720	7.661
2.5	1.27	1.230	7.607	7.679

As can be seen from the above table, the values of $\sqrt{\frac{Fa}{Ta}}$ and $\sqrt{\frac{Fb}{Tb}}$ are fairly constant, within experimental errors.

The plot of the periods (T_a and T_b) against the corresponding ratios n is shown in fig. (2). It can be seen from the plot that values of the ratio for equal periods as well as the

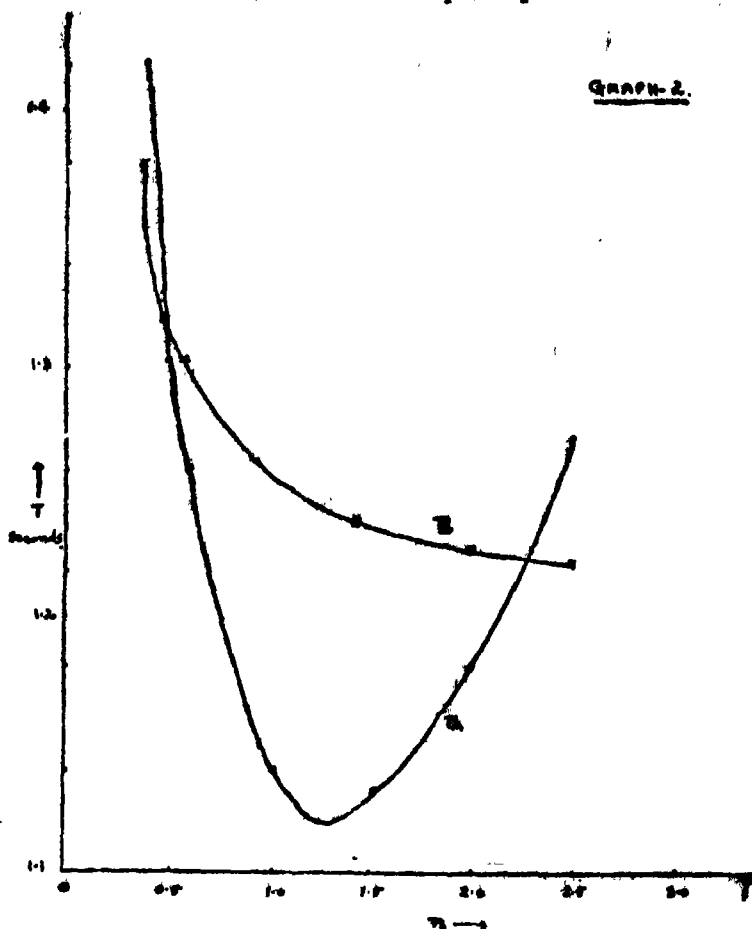


Fig. 2

minimum period agree very well with the theoretical values as shown below :

	Theory	Experiment
Equal Periods	$n = 0.5, 2.252$	$n = 0.5, 2.251$
Minimum Periods	$n = 1.235$	$n = 1.25$

The values of 'g' calculated from the mean value of \sqrt{Fa}/Ta and \sqrt{Fb}/Tb comes out to be 978.55 cm./sec.².

As an extension to the above case, we took two pairs of equal isosceles triangles attached to the sides of a rectangular lamina.

Let $2h$ and $2b$ be the length and breadth respectively of the rectangular lamina and a pair of equal isosceles triangles with base $2b$ and altitude h be attached to the sides of the rectangle having the length $2h$ and let a pair of equal isosceles triangles with base $2h$ and altitude b be attached to the other two sides of the rectangle. Diagonals are $4h$ and $4b$. The body is made to oscillate about an axis passing through the edges of each of the diagonals perpendicular to the plane of the lamina and the periods Ta and Tb are noted.

The moment of inertia of the body about an axis passing through the end of the diagonal of length $4b$ is,

$$\frac{2M}{5} (h^2 + 7b^2);$$

so that the corresponding period is,

$$Ta = 2\pi \sqrt{\frac{2M(h^2 + 7b^2)}{6Mgb}} = 2\pi \sqrt{\frac{h}{3g} \left(n + \frac{7}{n}\right)} = 2\pi \left(\frac{h}{3g} \cdot Fa\right)^{\frac{1}{2}}$$

where, $n = \frac{h}{b}$ and $Fa = n + \frac{7}{n}$..(2)

Similarly the period about an axis passing through the edge of another diagonal and perpendicular to the plane of the lamina is,

$$Tb = 2\pi \sqrt{\frac{2M(7h^2 + b^2)}{6Mgh}} = 2\pi \sqrt{\frac{h}{3g} \left(7 + \frac{1}{n^2}\right)} = 2\pi \left(\frac{h}{3g} \cdot Fb\right)^{\frac{1}{2}} \text{..(3)}$$

where, $n = \frac{h}{b}$ and $Fb = 7 + \frac{1}{n^2}$..(4)

Hence for equal periods, $n + \frac{7}{n} = 7 + \frac{1}{n^2}$

i.e. $n^3 - 7n^2 + 7n - 1 = 0$

$\therefore n = 1, 3 \pm 2\sqrt{2}$.

The last two roots are reciprocal. Hence equal periods are obtained when the ratios are 1 and $3 + 2\sqrt{2} = 5.825$.

For minimum period,

$$\frac{d}{dn} \left(n + \frac{7}{n} \right) = 0$$

$$\therefore n = \sqrt{7} = 2.645$$

The results are similar to those in case (1).

A rhombic lamina of diagonals $4h$ and $4b$ was taken. The length was kept constant of 60 cms. and $4b$ was varied corresponding to the required ratios.

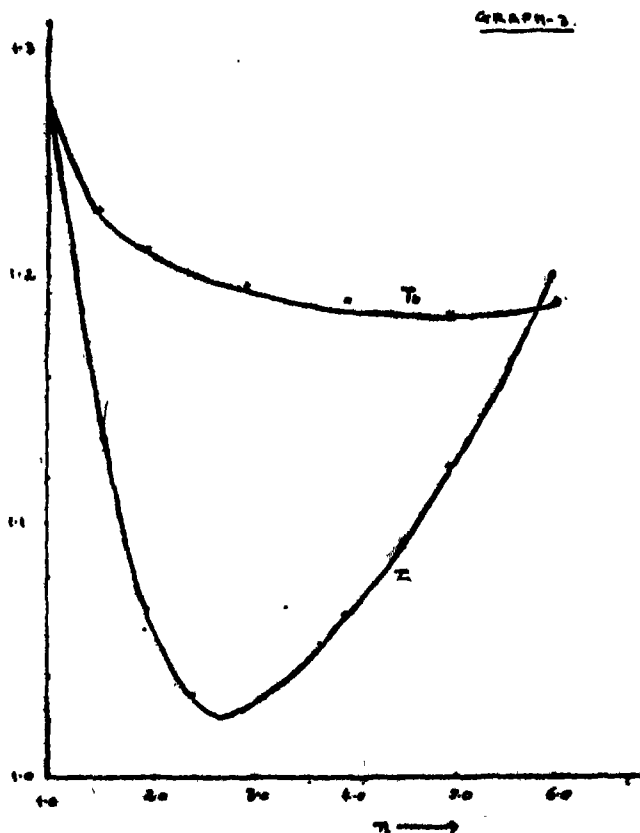


Fig. 3

The following table gives the actual observations :

Ratio	T_a second	T_b second	$\sqrt{\frac{Fa}{Ta}}$	$\sqrt{\frac{Fb}{Tb}}$
1.0	1.278	1.278	2.213	2.213
1.5	1.108	1.226	2.241	2.221
2.0	1.065	1.210	2.203	2.225
2.5	1.032	1.200	2.230	2.229
3.0	1.046	1.196	2.207	2.230
4.0	1.062	1.190	2.258	2.233
5.0	1.124	1.184	2.251	2.449
6.0	1.220	1.190	2.194	2.228

It is evident from the above table that the values of \sqrt{Fa}/Ta and \sqrt{Fb}/Tb are fairly constant. The plot of Ta and Tb against ' n ' is given in figure (3). It can be seen that the ratios for equal periods as well as for minimum period obtained from the graph agree very well with the theoretical values.

Conclusion

If symmetrical bodies in form of lamina of different shapes are taken and keeping one of the dimensions constant if the other is varied, and the periods about certain selected points are noted, a fairly accurate method to determine ' g ' is obtained.

The authors express their thanks to Shri M. P. Bhatt of Sarvajanic Science College, Surat for suggesting the problem and giving useful hints.

References

1. Freeman : American Journal of Physics, 22, 157 (1954).
2. Bhatt and Bhatt : Journal of M. S. University, Baroda.
77, Vol. VI, October, 1957.

THIOUREAS

[Synthesis of 1-Aryl/(substituted Benzyl)-3- α / β -Aryl
ethyl-2-thioureas]

S. P. KHARIDIA

M. G. Science Institute, Ahmedabad

and

J. J. TRIVEDI

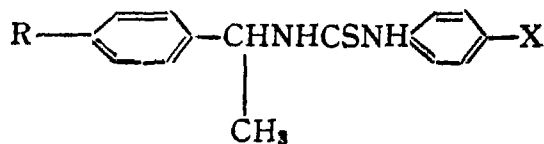
Shrimati B. C. Jalundhwala Science College, Cambay

Arylureas and thioureas are known to exhibit bacteriostatic activity.¹ Several benzyl thioureas also show bacteriostatic and fungitoxic activity.² Thioureas have also been shown to exhibit hypnotic and anesthetic activity.³ Since arylethyl amines show analgesic activity,⁴ it was of considerable interest to introduce this group in thiourea molecule. With this in view several 1-(subst. benzyl)-3-(α / β arylethyl)-2-thioureas have been synthesised. These compounds have been synthesised by the action of α / β -arylethyl amine on aryl/benzyl isothiocyanates.

EXPERIMENTAL

Substituted benzyl isothiocyanates were prepared as described previously.⁵ α -Arylethylamines were synthesised from the corresponding ketones by Leuckart reaction.³ β -Phenyl ethylamine was of Eastman practical grade. Thioureas listed in table I to IV were synthesised by the action of appropriate amines on substituted aryl/benzyl isothiocyanates and were crystallised from aqueous ethanol.³

Table I

1-(α -Arylethyl)-3-aryl-2-thioureas

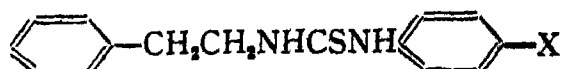
No.	Compounds		M.P.	Mol. formula	% Sulphur	
	R=	X=			Found	Calc.
1.	H	o.Cl	125°	C ₁₅ H ₁₅ ClN ₂ S	11.2	11.0
2.	"	m.Cl	116°	"	11.3	11.0
3.	"	p.Cl	142°	"	11.1	11.0
4.	"	p.Br	137°	C ₁₅ H ₁₅ BrN ₂ S	9.8	9.6
5.	"	o.CH ₃	110°	C ₁₆ H ₁₈ N ₂ S	12.0	11.9
6.	"	m.CH ₃	130°	"	12.1	11.9
7.	"	p.CH ₃	121°	"	12.2	11.9
8.	"	o.OCH ₃	122°	C ₁₆ H ₁₈ ON ₂ S	11.4	11.2
9.	"	p.OCH ₃	94°	"	11.3	11.2
10.	p.Cl	H	115°	C ₁₅ H ₁₅ ClN ₂ S	11.4	11.2
11.	"	o.Cl	120°	C ₁₅ H ₁₄ Cl ₂ N ₂ S	10.1	9.9
12.	"	m.Cl	123°	"	10.0	9.0
13.	"	p.Cl	128°	"	10.1	9.9
14.	"	p.Br	160°	C ₁₅ H ₁₄ BrClN ₂ S	8.7	8.8
15.	"	o.CH ₃	130°	C ₁₆ H ₁₇ ClN ₂ S	10.7	10.5
16.	"	m.CH ₃	99°	"	10.6	10.5
17.	"	p.CH ₃	123°	"	10.7	10.5
18.	"	o.OCH ₃	113°	C ₁₆ H ₁₇ OCIN ₂ S	9.9	9.8
19.	"	p.OCH ₃	149°	"	10.0	9.8
20.	p.Br	H	129°	C ₁₅ H ₁₅ BrN ₂ S	9.8	9.6
21.	"	o.Cl	140°	C ₁₅ H ₁₄ BrClN ₂ S	8.8	8.7
22.	"	m.Cl	133°	"	8.9	8.7
23.	"	p.Cl	156°	"	8.9	8.7
24.	"	p.Br	171°	C ₁₅ H ₁₄ Br ₂ N ₂ S	7.9	7.7
25.	"	o.CH ₃	131°	C ₁₆ H ₁₇ BrN ₂ S	9.5	9.2
26.	"	m.CH ₃	137°	"	9.4	9.2
27.	"	p.CH ₃	141°	"	9.3	9.2

Table II

1-(α -Arylethyl)- β -(substituted benzyl)-2-thioureas

No.	Compounds		M.P.	Mol. formula	% Sulphur	
	R=	X=			Found	Calc.
1.	H	H	97°	C ₁₆ H ₁₈ N ₂ S	12.0	11.9
2.	"	o.Cl	115°	C ₁₆ H ₁₇ ClN ₂ S	10.6	10.5
3.	"	p.Cl	128°	"	10.7	10.5
4.	"	o.CH ₃	107°	C ₁₇ H ₂₀ N ₂ S	10.6	10.3
5.	"	m.CH ₃	110°	"	10.4	10.3
6.	"	p.CH ₃	114°	"	10.5	10.3
7.	"	3:4(CH ₃) ₂	118°	C ₁₈ H ₂₂ N ₂ S	10.8	10.7
8.	"	2:4(CH ₃) ₂	101°	"	10.8	10.7
9.	"	2:5(CH ₃) ₂	105°	"	11.0	10.7
10.	p.Cl	H	98°	C ₁₆ H ₁₇ ClN ₂ S	10.7	10.5
11.	"	o.Cl	103°	C ₁₆ H ₁₆ Cl ₂ N ₂ S	9.5	9.4
12.	"	p.Cl	113°	"	9.6	9.4
13.	"	o.CH ₃	94°	C ₁₇ H ₁₉ ClN ₂ S	10.3	10.1
14.	"	m.CH ₃	126°	"	10.2	10.1
15.	"	p.CH ₃	130°	"	10.4	10.1
16.	"	3:4(CH ₃) ₂	126°	C ₁₈ H ₂₁ ClN ₂ S	9.8	9.6
17.	"	2:4(CH ₃) ₂	117°	"	9.7	9.6
18.	"	2:5(CH ₃) ₂	121°	"	9.9	9.6
19.	p.Br	H	129°	C ₁₆ H ₁₇ BrN ₂ S	9.3	9.2
20.	"	o.Cl	120°	C ₁₆ H ₁₆ BrClN ₂ S	8.5	8.3
21.	"	p.Cl	124°	"	8.5	8.3
22.	"	o.CH ₃	108°	C ₁₇ H ₁₉ BrN ₂ S	9.0	8.8
23.	"	m.CH ₃	112°	"	8.9	8.8
24.	"	p.CH ₃	121°	"	8.9	8.8
25.	"	3:4(CH ₃) ₂	117°	C ₁₈ H ₂₁ BrN ₂ S	8.7	8.5
26.	"	2:4(CH ₃) ₂	123°	"	8.6	8.5
27.	"	2:5(CH ₃) ₂	130°	"	8.7	8.5
28.	"	o.OCH ₃	155°	C ₁₆ H ₁₇ OBrN ₂ S	9.0	8.8
29.	"	p.OCH ₃	160°	"	8.9	8.8

Table III

1- β -Phenyl ethyl-3-aryl-2-thioureas

No.	Compounds X=	M.P.	Mol. formula	% Sulphur	
				Found	Calc.
1.	o.Cl	96°	C ₁₅ H ₁₅ ClN ₂ S	11.2	11.0
2.	m.Cl	84°	"	11.1	11.0
3.	p.Cl	127°	"	11.3	11.0
4.	p.Br	122°	C ₁₅ H ₁₅ BrN ₂ S	9.8	9.6
5.	o.CH ₃	120°	C ₁₆ H ₁₈ N ₂ S	12.0	11.9
6.	m.CH ₃	92°	"	12.2	11.9
7.	p.CH ₃	107°	"	12.1	11.9
8.	o.OCH ₃	86°	C ₁₆ H ₁₈ ON ₂ S	11.4	11.2
9.	p.OCH ₃	109°	"	11.3	11.2

Table IV

1- β -Phenyl ethyl-3-(substituted benzyl)-2-thioureas

No.	Compounds X=	M.P.	Mol. formula	% Sulphur	
				Found	Calc.
1.	o.Cl	73°	C ₁₆ H ₁₇ ClN ₂ S	10.7	10.5
2.	p.Cl	80°	"	10.6	10.5
3.	o.CH ₃	90°	C ₁₇ H ₂₀ N ₂ S	10.4	10.3
4.	m.CH ₃	62°	"	10.5	10.3
5.	p.CH ₃	66°	"	10.4	10.3
6.	3:4(CH ₃) ₂	72°	C ₁₈ H ₂₂ N ₂ S	10.9	10.7
7.	2:4(CH ₃) ₂	68°	"	10.8	10.7
8.	2:5(CH ₃) ₂	65°	"	10.8	10.7

The authors thank Dr. R. D. Desai for interest in the work, The Ahmedabad Education Society and Khambhat Taluka Sarvajanic Kelavani Mandal for facilities and University Grants Commission, Government of India for a research grant to one of them. (J. J. T.)

25-8-65

References

1. Beaver et al, J. Am. Chem. Soc. 1957, **79**, 1236,
Buu Hoi et al, J. Chem. Soc. 1958, 2815
Doub et al, J. Am. Chem. Soc. 1958, **80** 2205.
2. Buck and De Beer U.S. patent 1936, 2254, 136 Chem.
Abstr, 1941, **35**, 8212.
De Beer. J. Pharmacol. Exptl. Therap. 1936, **57**, 19.
3. Ingersoll Org. synthesis coll. Vol. II, 503.
4. Mc Coubrey Brit. J. Pharmacol., 1953, **8**, 22.
5. Shah et al, J. Indian Chem. Soc. 1956, **33**, 423.
Mc Kay et al, J. Am. Chem. Soc. 1959, **81**, 4328.

THIAZOLIDONES—PART VIII

Synthesis of 5-Alkyl-2 α/β -Arylalkylimino-4-Thiazolidones

S. P. KHARIDIA

M. G. Science Institute, Ahmedabad

and

J. J. TRIVEDI

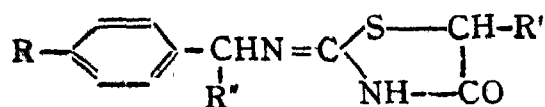
Shrimati B. C. Jalundhwala Science College, Cambay

Several thiazolidone derivatives have been found to exhibit anticonvulsant¹ and local anesthetic² activities. Since arylethylamines show analgesic activity,³ it was of considerable interest to prepare thiazolidones containing arylethyl group. With this in view several 5-alkyl-2-(α -aryl alkyl imino)-4-thiazolidones and 5-alkyl-2- β -phenyl ethylimino-4-thiazolidones have been prepared by condensing α -arylethyl thioureas and β -phenylethyl thioureas with α -halo-fatty acids.

Experimental

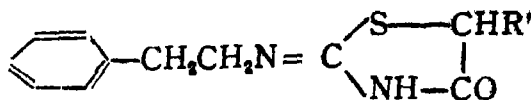
α -Arylethyl thioureas and β -phenylethyl thioureas were prepared by passing ammonia in alcoholic solution of the corresponding isothiocyanates.⁵ Substituted thiazolidones were synthesised from the corresponding thioureas and α -halo-fatty acids as described previously.⁴ Thiazolidones were crystallised from alcohol and are described in tables I & II.

Table I

5-Alkyl-2- α -arylalkyl imino-4-thiazolidones

No.	Compounds			M.P.	Mol. Formula	% Sulphur	
	R	R'	R''			Found	Calc.
1.	H	H	CH ₃	156°	C ₁₁ H ₁₂ N ₂ OS	14.6	14.5
2.	p.Cl	"	"	189°	C ₁₁ H ₁₁ ClN ₂ OS	12.7	12.6
3.	p.Br	"	"	190°	C ₁₁ H ₁₁ BrN ₂ OS	10.9	10.7
4.	H	"	C ₂ H ₅	175°	C ₁₂ H ₁₄ N ₂ OS	13.8	13.7
5.	"	"	C ₃ H ₇	143°	C ₁₃ H ₁₆ N ₂ OS	13.1	12.9
6.	"	CH ₃	CH ₃	141°	C ₁₂ H ₁₄ N ₂ OS	13.9	13.7
7.	p.Cl	"	"	156°	C ₁₂ H ₁₃ ClN ₂ OS	12.1	11.9
8.	p.Br	"	"	166°	C ₁₂ H ₁₃ BrN ₂ OS	10.3	10.2
9.	H	"	C ₂ H ₅	141°	C ₁₃ H ₁₆ N ₂ OS	13.0	12.9
10.	H	"	C ₃ H ₇	152°	C ₁₄ H ₁₈ N ₂ OS	12.4	12.2
11.	H	C ₂ H ₅	CH ₃	120°	C ₁₃ H ₁₆ N ₂ OS	13.1	12.9
12.	p.Cl	"	"	130°	C ₁₃ H ₁₅ ClN ₂ OS	11.4	11.3
13.	p.Br	"	"	145°	C ₁₃ H ₁₅ BrN ₂ OS	9.9	9.8
14.	H	"	C ₂ H ₅	131°	C ₁₄ H ₁₈ N ₂ OS	12.3	12.2
15.	"	"	C ₃ H ₇	149°	C ₁₅ H ₂₀ N ₂ OS	11.7	11.6
16.	"	n.C ₃ H ₇	CH ₃	107°	C ₁₄ H ₁₈ N ₂ OS	12.4	12.2
17.	p.Cl	"	"	121°	C ₁₄ H ₁₇ ClN ₂ OS	11.9	11.8
18.	p.Br	"	"	137°	C ₁₄ H ₁₇ BrN ₂ OS	9.6	9.4
19.	H	"	C ₂ H ₅	128°	C ₁₆ H ₂₀ H ₂ OS	11.7	11.6
20.	H	"	C ₃ H ₇	112°	C ₁₆ H ₂₂ N ₂ OS	11.8	11.6
21.	H	n-C ₄ H ₉	CH ₃	101°	C ₁₅ H ₂₀ N ₂ OS	11.7	11.6
22.	p.Cl	"	"	116°	C ₁₅ H ₁₉ ClN ₂ OS	10.4	10.3
23.	p.Br	"	"	121°	C ₁₅ H ₁₉ BrN ₂ OS	9.1	9.0
24.	H	"	C ₂ H ₅	121°	C ₁₆ H ₂₂ N ₂ OS	11.7	11.6
25.	H	"	C ₃ H ₇	103°	C ₁₇ H ₂₄ N ₂ OS	10.6	10.5

Table II

5-Alkyl-2- β -phenyl ethyl imino-4-thiazolidones

No.	Compounds R'	M.P.	Mol. Formula	% Sulphur	
				Found	Calc.
1.	H	149°	C ₁₁ H ₁₃ N ₂ OS	14.7	14.5
2.	CH ₃	117°	C ₁₂ H ₁₄ N ₂ OS	13.9	13.7
3.	C ₂ H ₅	105°	C ₁₃ H ₁₅ N ₂ OS	13.0	12.9
4.	n-C ₃ H ₇	99°	C ₁₄ H ₁₇ N ₂ OS	12.3	12.2
5.	n-C ₄ H ₉	89°	C ₁₅ H ₁₉ N ₂ OS	11.8	11.6

The authors thank Dr. R. D. Desai for interest in the work, The Ahmedabad Education Society and Khambhat Taluka Sarvajanic Kelavani Mandal for facilities and University Grants Commission, Government of India for a Research grant to one of them (J. J. T.).

25-8-1965

References

1. Chen et al, Arch. Neurol psychiat, 1951 **66**, 329.
Troutman and Long, J. Am. Chem. Soc. 1948, **70** 3436.
2. Leudena and Hoppe, J. Am. Pharm. Asso. 1951, **40**, 132.
Surrey et al, J. Am. Chem. Soc. 1949, **71**, 3354.
3. Mc Coubrey, Brit. J., Pharmacol. 1953, **8**, 22
4. Raval and Trivedi, J. Indian Chem. Soc. 1959, **36**, 733.
5. Shah et al, J. Indian Chem. Soc. 1956, **33**, 423.

1. The first part of the document is a letter from the President of the United States to the Congress, dated January 1, 1862. It is a very important document, as it contains the President's annual message to Congress. The letter is written in a formal, dignified style, and it is one of the most important documents in the history of the United States.

2. The second part of the document is a report from the Secretary of the Treasury, dated January 1, 1862. It is a very important document, as it contains the Secretary's annual report to Congress. The report is written in a formal, dignified style, and it is one of the most important documents in the history of the United States.

3. The third part of the document is a report from the Secretary of the Interior, dated January 1, 1862. It is a very important document, as it contains the Secretary's annual report to Congress. The report is written in a formal, dignified style, and it is one of the most important documents in the history of the United States.

4. The fourth part of the document is a report from the Secretary of the War, dated January 1, 1862. It is a very important document, as it contains the Secretary's annual report to Congress. The report is written in a formal, dignified style, and it is one of the most important documents in the history of the United States.

5. The fifth part of the document is a report from the Secretary of the Navy, dated January 1, 1862. It is a very important document, as it contains the Secretary's annual report to Congress. The report is written in a formal, dignified style, and it is one of the most important documents in the history of the United States.

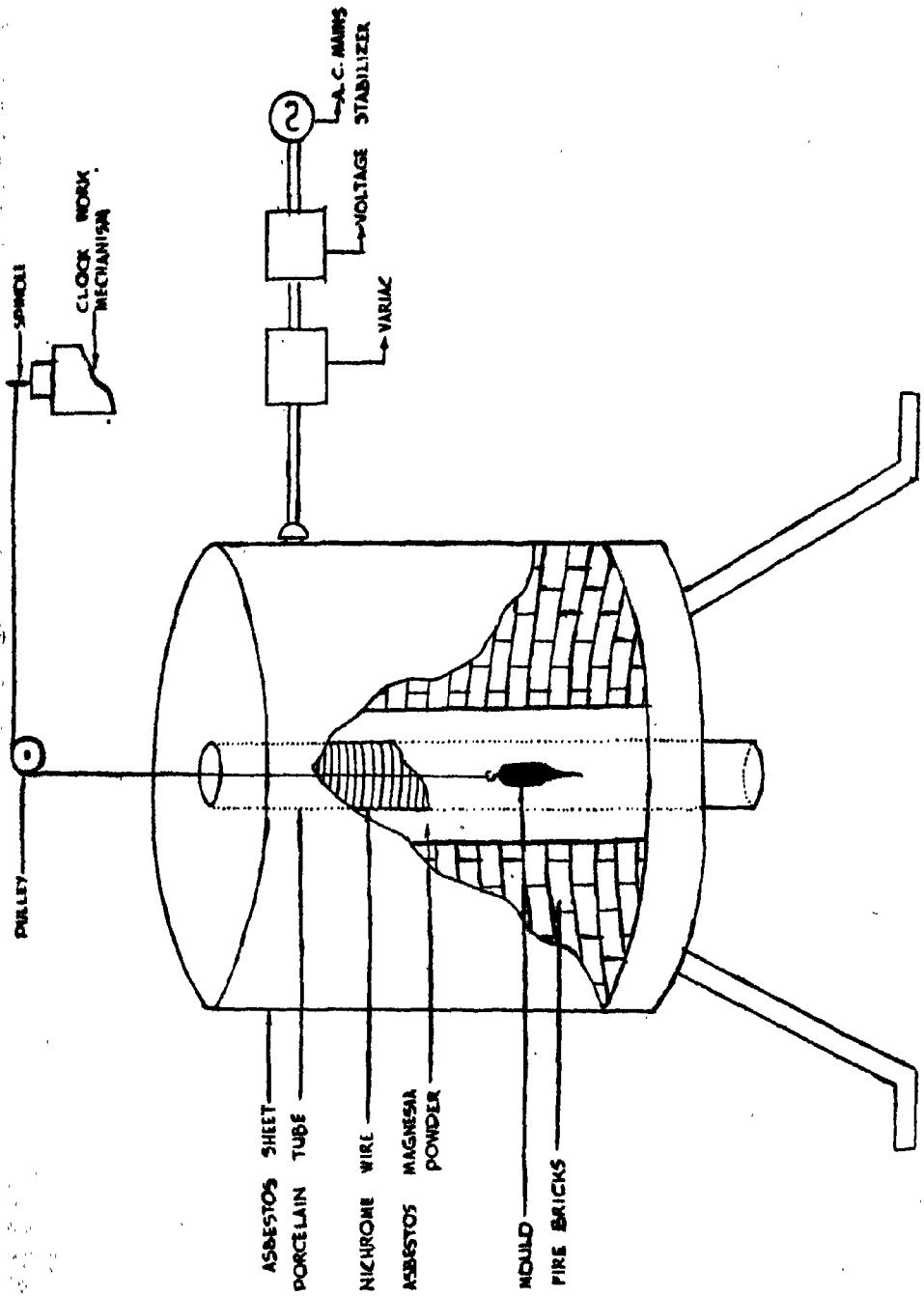
6. The sixth part of the document is a report from the Secretary of the State, dated January 1, 1862. It is a very important document, as it contains the Secretary's annual report to Congress. The report is written in a formal, dignified style, and it is one of the most important documents in the history of the United States.

7. The seventh part of the document is a report from the Secretary of the War, dated January 1, 1862. It is a very important document, as it contains the Secretary's annual report to Congress. The report is written in a formal, dignified style, and it is one of the most important documents in the history of the United States.

8. The eighth part of the document is a report from the Secretary of the Navy, dated January 1, 1862. It is a very important document, as it contains the Secretary's annual report to Congress. The report is written in a formal, dignified style, and it is one of the most important documents in the history of the United States.

9. The ninth part of the document is a report from the Secretary of the State, dated January 1, 1862. It is a very important document, as it contains the Secretary's annual report to Congress. The report is written in a formal, dignified style, and it is one of the most important documents in the history of the United States.

10. The tenth part of the document is a report from the Secretary of the War, dated January 1, 1862. It is a very important document, as it contains the Secretary's annual report to Congress. The report is written in a formal, dignified style, and it is one of the most important documents in the history of the United States.



ON GROWING SINGLE CRYSTALS OF BISMUTH

V. P. BHATT
Physics Department,
J. & J. College of Science, Nadiad

Abstract

The communication presents an analysis of the factors affecting the growth of single crystals of bismuth. It is observed that purity of the material, temperature gradient, thermal stresses and occluded gases, are the vital factors which must be given due consideration for the successful growth of the single crystals of bismuth.

Introduction

The activity in the field of solid state Physics during the past few decades has resulted in an increasing concern with the science and technique of growing large single crystals. The present communication deals with the growing of single crystals of industrially important bismuth metal. Attention is focussed on the various vital factors affecting their growth.

Experimental set up

There are number of methods of growing single crystals of metals, e.g., growth of Crystals from the vapour, from the melt and by electrolytic method. Of all these methods, it is observed that to obtain a large single crystal, the crystals must be grown from melts. Excellent books on the subject are now available (1, 2). For bismuth, the best artificial crystals have been obtained from the melt. Due to its importance in industry, a number of properties of single crystals are studied (3, 4, 5, 6, 7, 8).

The experimental set up for growing single crystals from the melt is similar to that followed by Bridgmann (9), using

the vertical gradient furnace. This furnace was designed and fabricated in the laboratory. It gave a maximum steady temperature of 450°C . It can be maintained at any temperature with the help of thermoregulator with an error of $\pm 2^{\circ}\text{C}$. To avoid fluctuations in temperature due to voltage variations, a voltage stabilizer was used. The furnace was calibrated by using a standard chromel—alumel thermocouple.

The required amount of metal was placed in a mould or a glass tube. The tube was then evacuated. It was then placed at the centre of the furnace of which the temperature is slightly higher (usually 10° to 50°C) than the melting point (271°C) of the bismuth metal. It was allowed to cool slowly by the gearing mechanism. This gearing unit was also fabricated in the laboratory. In this way, several crystals were grown and examined. Many factors are operating in the technique for getting successful results. Among the important controlling factors are the —

- (i) Purity of the metal
- (ii) temperature gradient (a) in the furnace, and (b) in the specimen
- (iii) The rate of growth of single crystals.

These factors are more or less common for most metals. Bismuth metal possesses an unusual combination of properties which, therefore, increase the difficulties for growing them. The prominent important properties which are very vital in the growth of the crystals are as follows:

1. Bismuth has much smaller conductivity in the solid state than in the liquid. The conductivity ratio is given by

$$\frac{K_{\text{solid}}}{K_{\text{liquid}}} = \frac{1}{2}.$$

Hence a good degree of sudden drop of temperature at the liquid solid interface is observed. This affects the rate of growth of the crystal and introduces thermal stresses.

2. The surface tension increases with the increase of temperature. This is important in the formation of single seed of the crystal.

3. The density of molten bismuth decreases regularly as the temperature rises. The metal resembles water in that the liquid attains a maximum density at a temperature just above melting point.

4. Bismuth expands when it is cooled from above the melting point to below the melting point. This also affects the formation of a single seed of the crystal.

5. The metal is very susceptible to supercooling.

In addition to these known properties, the important salient points studied by the author for the successful results are the following :

- (i) Purity of the material
- (ii) The temperature gradient
- (iii) Growth rate
- (iv) Effect of stresses during growth
- (v) Occluded gas.

These will now be discussed in detail.

Purity of the material :

Bismuth metal was supplied by various firms and was found to contain various amounts and types of impurities. It was found from the chemical analysis that the proportion of impurity present in the metal was different for different lots. It was observed during the course of the work that impurity played a very vital role. The percentage yield of single crystals depended upon the initial purity of the material; purer is the material greater is the yield. In some cases of very impure samples of metals (99% pure + 1% impurity) single crystals could not be obtained. Hence the zone refining technique (10) was employed to obtain pure material. As a result of the study of the effect of impurity on the formation of growth of crystals, the author could evolve a simple method of judging qualitatively the impure samples of the single crystals of bismuth.

Temperature gradient :

Temperature gradient in the furnace and hence in the specimen is an important factor in getting good single crystals with desired orientation. The effect of this factor can be predicated only in conjunction with the rate of lowering the specimen. The present study indicates that change of temperature gradient is less effective than the change in the rate of lowering for obtaining good crystals.

It was also observed that for a single crystal of bismuth kept at a temperature of about 10°C higher than the melting point and cooled slowly, the orientation of the solid has not changed significantly. When it was heated to a temperature higher than 10°C and then resolidified, a random orientation resulted. This shows that up to a temperature of about 10°C per cm., the orientation change was very little. Hence temperature gradient was kept to about this value or sometimes less.

Rate of growth :

The rate of growth of a crystal taken together with the temperature gradient in the furnace has a predominant effect on the orientation and perfection of the crystal. When the grown crystal was immersed in liquid air for cleaving, it was indeed a problem to find the exact direction along which it could be cut to obtain the cleavage plane. If an attempt is made to cleave it along any other direction through oversight or for finding the cleavage plane by trial and error, it immediately resulted in profound twinning. Moreover, if such attempts to get good cleavage are continued, the crystal becomes plastic and will not throw any light on the fundamental properties of crystals. Hence the very purpose for which the crystals are grown is defeated. This is one of the most important and decisive points for getting good cleavage of a well-grown crystal and studying the microtopography of single crystal surfaces. Hence determined attempts were made to get a good single crystal, with a pre-determined cleavage direction. To a greater extent the author was successful in achieving the result.

The inclination of the cleavage direction with the vertical axis of the mould were determined for several crystals. Some typical observations are as shown below :

(1) 0° (2) 20° (3) 30° (4) 35° (5) 45° (6) 60° (7) 70°
(8) 90° .

A surprising fact emerges. The inclination changes randomly and some times by large angle. From a study of inclination of a large number of single crystals under varying condition, it was found that slight temperature fluctuations giving rise to a major change at high temperature were responsible for this erratic and unusual behaviour of the crystals. To overcome this undesirable factor, instead of a single furnace, a double furnace fed by independent electric energy was used. This gave the desired and constant temperature gradient. The following reproducible results were then obtained.

<i>Angle between axis of the mould and the cleavage plane</i>	<i>Temperature gradient in oc/cm.</i>	<i>Rate of lowering</i>
0° – 35°	5°	0.6 mm/min.
35° – 90°	5°	5 mm/min.

Conclusion

The growth of the single crystal has been studied with reference to several important factors. It is pointed out that purity of the material, the temperature gradient, thermal stresses and occluded gas etc. are the important factors which should be given due consideration for the successful growth of the crystals with pre-determined orientation.

Acknowledgement

The author is grateful to Prof. N. S. Pandya and Dr. J. R. Pandya of Physics Department of the M. S. University of Baroda for their keen interest in this work. The author is also thankful to the Gujarat University for some financial help.

References

1. Lawson W. and Nielson (1958), Preparation of single crystals (Butterworths Scientific Publications, Lond.).
2. Buckley (1951), Crystal growth (John Wiley & Sons, Inc. New York).
3. Vongomperz (1922), Zeits Ch. Physik, **8**, 184.
4. Obrezemove and Shubnikov (1925), Trans. Phys. Rech. Lab. **100**, 21.
5. Shubnikov (1930), Proc. Acad. Sci. Amsterdam **33**, 327.
6. Goetz A. (1930), Phy. Rev. **35**, 1930.
7. Kapitza P. (1928), Proc. Roy. Soc., **119-A**, 358, 387, 401.
8. Goss and Weintroub (1952), Proc. Phys. Soc. (London), **65-B**, 56.
9. Bridgmann P. W. (1925), Proc. Am. Acad. Arts. Science, 60.
10. Pfann. W. G. (1958), Zone-melting (Wiley & Sons. Incorp., New York).

CONDUCTOMETRIC STUDIES OF SODIUM DIETHYLDITHIOCARBAMATE IN MIXED SOLVENTS

A. M. TRIVEDI,

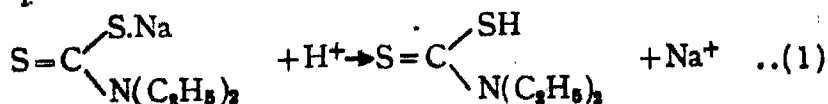
K. P. SONI* and I. M. BHATT

*Chemistry Department, University School of Sciences
Gujarat University, Ahmedabad-9*

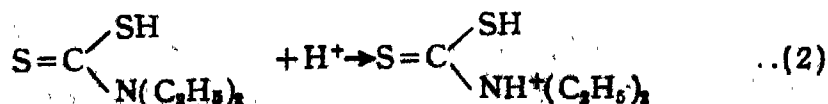
It was shown that sodium diethyldithiocarbamate (abbreviated as NaDDTC) is a diacidic base and can be titrated against acids in water, potentiometrically or conductometrically. A clear jump is obtained, when the two equivalents of the acids are consumed.¹ Later on the behaviour of NaDDTC was studied in non-aqueous solvents.² In the present investigation, NaDDTC has been titrated against different acids in mixed solvents. The influence of the dielectric constant of the medium on the equivalent conductance of NaDDTC has been investigated.

Solutions of NaDDTC in mixtures of water and alcohol, and water and dioxan were prepared and titrated against perchloric, hydrochloric and acetic acids. Redistilled alcohol was treated as 100%. Dioxan was purified by adding sodium hydroxide and then by distilling it. Acids used were of A.R. quality and were standardized against anhydrous sodium carbonate.

When an acid is added to NaDDTC, the following changes take place:



This is a fairly fast reaction. The reaction followed is somewhat slow:



*Chemistry Department, M. G. Science Institute, Ahmedabad-9.

Experimental

It has been observed that when an acid is added to a solution of NaDDTC, conductivity (as well as pH) changes slowly and acquires a constant value after about twentyfour hours. This is ascribed to a slow reaction (equation 2). The mixture of NaDDTC and acid was kept at room temperature for about twentyfour hours, in a tightly fitted glass stoppered flask. It was then transferred to the conductivity cell (cell constant: 0.2481 cm^{-1}) and the temperature was maintained at $25 \pm 0.1^\circ$. Conductivity measurements were made with Leeds and Northrup assembly or with Mullard Bridge.

NaDDTC in mixtures of alcohol and water, and dioxan and water was titrated against various acids. In the case of

dioxan water mixtures, titrations are carried out only against perchloric acid which obviously was the most suitable of the acids used. The solvent composition was varied from 10 to 100%. The results are depicted graphically in figures 1, 2, 3, 4 and 5. For the sake of brevity, tabular data are omitted.

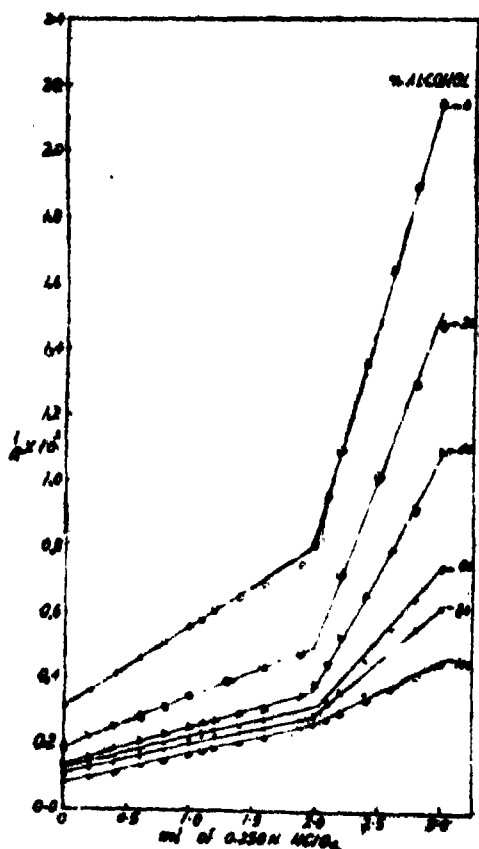


Fig. 1

0.2713 N acetic acid. The solutions of NaDDTC were prepared

Figure 1 shows the titration of 25 ml. of 10 mm NaDDTC against 0.250 N perchloric acid. Figure 2 shows the titration of 25 ml. of 5 mm NaDDTC against 0.270 N hydrochloric acid. Figure 3 shows the titration of 25 ml. of 10 mm NaDDTC against

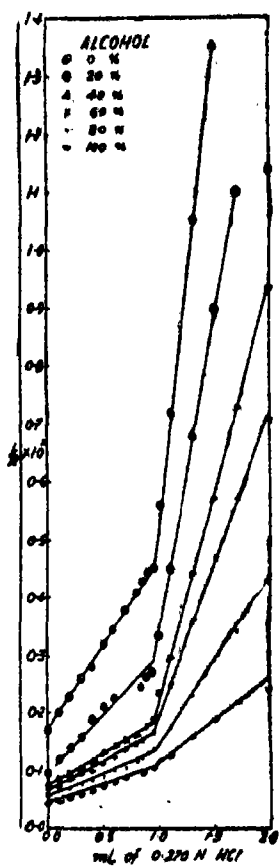


Fig. 2

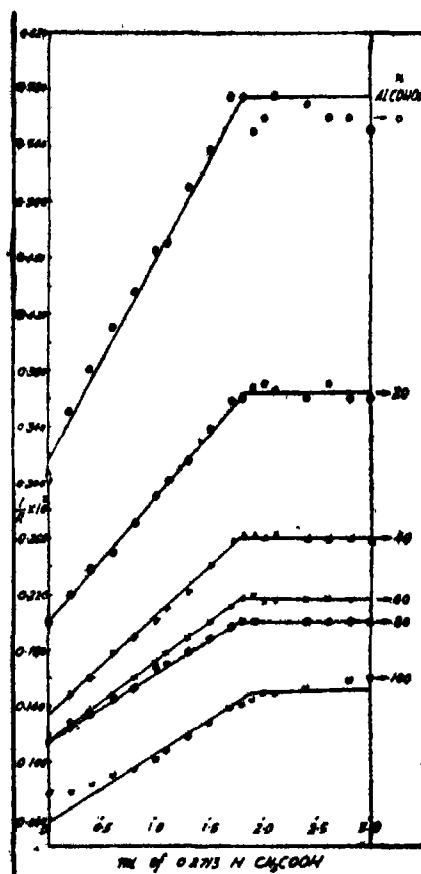


Fig. 3

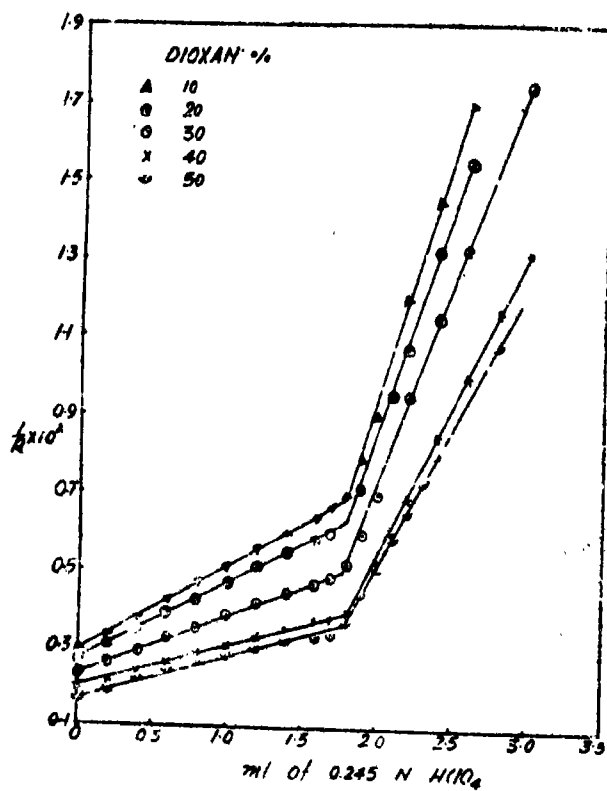


Fig. 4

in the different % of the alcohol, as indicated on the diagram. Figures 4 and 5 show the titration of NaDDTC in dioxan against perchloric acid.

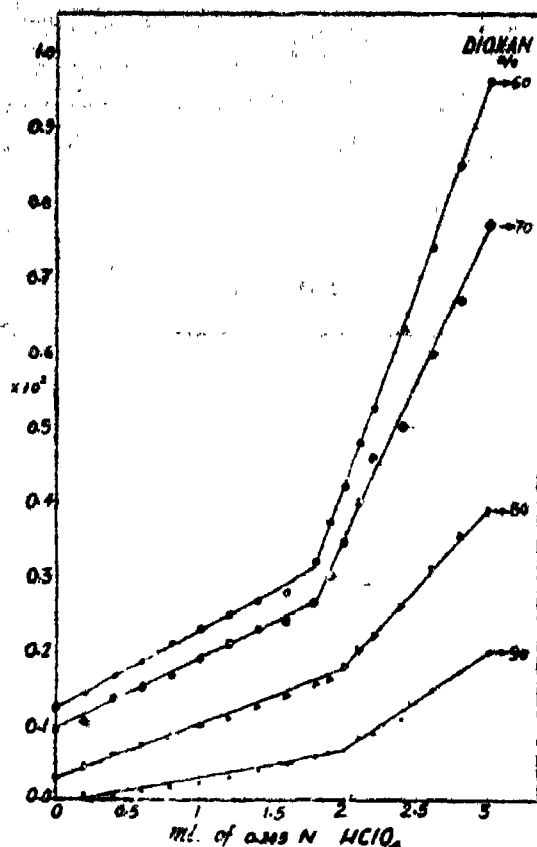


Fig. 5

Discussion

The acids used for titrations were prepared in water and the dilution of the titre on addition of the titrant acid, has been neglected. When NaDDTC is titrated against various acids, the end-point, when both the groups are neutralized, is independent of the acid used. Increasing the percentage of the organic solvent, decreases the sharpness of the end-point.

We shall now consider the data of the titration in alcohol water mixtures (Figures 1, 2 & 3). It appears that the titration

may be done with hydrochloric acid, perchloric acid and acetic acid; perchloric acid appears to be the most suitable; while in the case of acetic acid, the graph becomes almost parallel to the X-axis, after the end-point, because of the low conductance of acetic acid. When no acid is added (zero readings), the results obtained (Table 1) show that the replacement of solvent water by alcohol, results in a decrease of equivalent conductance; the influence of the organic solvent, becoming progressively less marked.

TABLE 1
Effect of Solvents on Conductivity of NaDDTC

Cell const. = 0.2481 cm^{-1}		Temp. $25^{\circ} \pm 0.1$		
%	$1/R \times 10^3$ mhos	Equivalent conductivity λ	Decrease in λ	Percentage decrease
<i>Ethyl Alcohol</i>				
0	0.310	76.9	0.0	0
20	0.190	47.2	29.7	39
40	0.138	34.3	42.6	55
60	0.120	29.8	47.1	61
80	0.110	27.3	49.6	65
100	0.092	22.8	54.1	70
<i>Dioxan</i>				
0	0.310	76.9	0.0	0
20	0.270	60.4	16.5	22
40	0.190	42.5	34.4	48
60	0.125	31.0	45.9	60
80	0.030	7.4	69.5	90
90	0.002	0.5	76.4	99

Thus, when water is replaced by alcohol to the extent of 20%, the equivalent conductance decreases by about 39%. Subsequent replacement of water by alcohol to the same extent, results in further decrease of conductance to the extent of 16,

6, 4 and 5% respectively. In the case of dioxan-water mixture also, there is a decrease in equivalent conductance on addition of increasing quantity of dioxan. The situation is almost similar until the dioxan is to the extent of 60%. Subsequently, the decrease in equivalent conductance becomes more marked. Thus, in case of alcohol, increasing the percentage of alcohol from 60 to 100%, decreases the equivalent conductance by seven units only, the equivalent conductance in 100% being about threefourth of its value in 60% alcohol. On the other hand, the replacement of water by dioxan (from 60 to 90%) results in a tremendous decrease in the equivalent conductance; the value in 90%, being only about 1.5% of its value in 60% dioxan. It appears difficult to attribute this change entirely to the change in dielectric constant of the medium. It may be due to the mechanism of conductance becoming markedly different, when the mixture consists more or less entirely of dioxan.

Thanks are due to University Grants Commission and Gujarat University for grants towards equipments and chemicals. Thanks are also due to Ahmedabad Education Society for providing Laboratory facilities.

References

1. Soni and Trivedi, J. Ind. Chem. Soc., **37** (1960), 349.
2. Soni and Trivedi, *ibid.*, **38** (1961), 65.

ગુજરાતમાં ખનિજ તેલની ખોજ

ડૉ. કે. જી. નાયક

એમ.એ. (ઇંગ્લેન્ડ), ડી.એસ.સી. (લંડન),

એફ.આર.આર્ટ્સી., એફ.એન.આર્ટ્સ.

પ્રિન્સિપાલ, શ્રી. એન. કે. એમ. સાયન્સ કોલેજ,

તિલકશેડ, વલસાડ, જિ. વલસાડ,

ગુજરાત રાજ્ય (ભારત)

આશરે ચાલીસ વર્ષ પૂર્વે, કે. વડોદરા નરેશ મહારાજ સર સમાજરાવ ગાયકવાડના લક્ષ્મી વિલાસ રાજમહેલના કંપાઉન્ડમાં આવેલા એક મોટા કૂવાના ખોરિંગનું કામકાજ ખેત્રજી માસ બંધ રહ્યું, જે અરસામાં ખોરિંગના કાણા દ્વારા ટપકતું લગભગ એક ગેલન કાળું ખનિજ તેલ એકઠું કરી શકાયું હતું. તે વેળા વડોદરા સરકારના ઔદ્યોગિક રસાયણશાસ્ત્રી અને રસાયણશાસ્ત્રના પ્રાધ્યાપક તરીકે કામ કરતા આ લેખકને, ધીમે ધીમે ટપકી રહેલા આ ખનિજ તેલ અને ગેસના આ ઓશિંતા દેખાવ અંગે પૂછવામાં આવ્યું હતું. તે જ વખતે, બાવનમર રાજમના ધોધા શહેરની નજીક પણ ગેસ નીકળતો હતો એવી વાત આ લેખકના સાંભળવામાં આવી. વળી સુરત જિલ્લાના ઉનાઈ ગામે, મરમ પાણીના ઝરામાં, કુદરતી ગેસના પરપોટા સનન નીકળ્યા કરે છે એ વાત પણ, તે સ્થળની મુલાકાતે જનારની જાણમાં છે. આ લેખકે આ બંને સ્થળે નીકળેલો ગેસ અલગ અલગ એકઠો કરી, બંને સ્થળોના ગેસની સંપૂર્ણ રીતે તપાસ કરી; જેમાં મારૂમ પડ્યું કે, એ દરેક સ્થળના ગેસમાં થંદક તત્ત્વો એક જ સરખાં હતાં. ત્યાર બાદ, મહારાજ સમાજરાવના લક્ષ્મી વિલાસ રાજમહેલમાંના ખોરિંગમાંથી નીકળેલા કાળા ખનિજ તેલને, વડોદરા કોલેજની રસાયણશાસ્ત્રની પ્રયોગશાળામાં જુદા જુદા ઘટકોમાં વિભક્ત કરી નાખવામાં આવ્યું હતું. આ જુદા જુદા ઘટક અંશોનો સંપૂર્ણ અભ્યાસ કરી, તે વખતની વડોદરા સરકારને લેખકે સંપૂર્ણ અહેવાલ સુપરત કરેલો. તે અહેવાલમાં જણાવવામાં આવ્યું હતું કે, લક્ષ્મી વિલાસ રાજમહેલમાં માલતા ખોરિંગના કામકાજ દરમિયાન મળી આવેલું ખનિજ તેલ, અમેરિકાના ટેક્સાસ વિભાગમાં મળી આવેલા ખનિજ તેલને દરેક બાબતમાં મળતું આવતું હતું.

ધોધા અને ખંભાત, એ બંને શહેરો, ખંભાતના અખાતના સામસામા કાંઠે આવેલાં છે; એટલે, જૂતરવિલાના અને રસાયણશાસ્ત્રના એક અભ્યાસી હોઈ, આ લેખકે એવા અનુમાન ઉપર આવ્યા કે ખનિજ તેલ અને ગેસનો આ એક પટો, ખંભાતના અખાતના તળિયામાં થઈ, વડોદરા-મરમ થઈ, સુરત જિલ્લાના ઓલપાડ ગામ આમળ થઈ, ઉનાઈના મરમ પાણીના ઝરા મુખી વિસ્તરે છે; તેમજ, એમણે એમ પણ સૂચ્યું હતું કે, વડોદરા

ઠોરે આ તેલપટ્ટી ઉપર આવેલું છે અને તેની નજીકના વિસ્તારમાં ખનિજ કાલસાનો જથ્થો ખૂબ હોઈ શકે. વડોદરા સરકારે તે ક્ષેત્રની વિશાળ સંબંધિત તથાકમાં આવેલી સુતરાઉ ચિલોને ધસવું પશુ હતું કે, જે તેઓ આ કુદરતી ગેસનો, શક્તિ ઉત્પાદન કરવા માટે અગત્ય તરીકે ઉપયોગ કરે તે, વડોદરા સરકાર તે દિશામાં સક્રિય પગલાં લેવા તૈયાર છે. પશુ તે વખતનો મિથેનિયમ, આમ કરવા તૈયાર ન થયો. એટલે, આ વાત ત્યાં જ પડતી મૂકવામાં આવી હતી.

પશુ તાજેતરમાં જ (૧૯૫૮-૬૦), લુણેજ (ખંભાત), વડોદરા (વડોદરા) અને હળત (અંકલેશ્વર પાસે ભસ્મ જિલ્લામાં) મુકામે આવા ખનિજ તેલના વિસ્તારો મળી આવતાં, એ વાત નિઃશંકપણે સ્થાપિત થઈ ચૂકી છે, કે આ લેખકની આગાહીઓ પૂરતી રીતે સાચી પડી છે. આ લેખક અત્યારે પશુ દ્વિખંડપૂર્વક આગાહી કરે છે કે, એવોજ ઉપર પ્રમાણે આંકેલી પટ્ટી સંબોધ આનમાં રાખી ખોરિંગ-કામ ચાલુ રખાય તો ભવિષ્યમાં ગુજરાતમાં હજી વધુ અનન્યપીઓની આશા ખેરાક સખી શકાય.

ગુજરાતમાં ખનિજ તેલની શોધખોળના ઇતિહાસ વિષેના ઉપરના અહેવાલના પ્રકાશન પછી, ભારતનું શૂસ્તરીય મોજણી ખાતું અમને એમ જણાવે છે કે, ગુજરાતમાં ખનિજ તેલના અસ્તિત્વ વિષે, ઈ. સ. ૧૯૨૧ની આસપાસમાં, તે વખતની વડોદરાની ગાયકવાડ સરકારે તેમનું ખાન ખેંચું હતું જેની આ લેખકને અત્યાર સુધી ખબર ન હતી. પરંતુ, ભારતના શૂસ્તરીય ખાતાએ, એ તેલ કઈ જાતનું છે, તે કેવા ઉપયોગમાં આવે તેવું છે, તે ખાખતમાં, તેમ જ એ તેલક્ષેત્રના, ગુજરાતમાં ઉનાઈથી માંડીને છેક પંજાબના જવાણામુખી સુધી વિસ્તરેલા સંબંધિત વિશાળ પટાની શોધખોળ ખાખતમાં, કહી જ આગાહી કરી ન હતી; તેમ જ, તે ખાખતમાં કોઈ નક્કર પગલું ભર્યું ન હતું. તેલક્ષેત્રનો એ વિશાળ પટો, ઉનાઈના મરમ પાણીના ઝરાથી માંડી, સુરત જિલ્લાના ઓલપાડ ગામ આગળ થઈ, અંકલેશ્વરના માર્ગ આગળ વધી, વડોદરા આગળ થઈ, ખંભાતના અખાત માર્ગે છેક સામે કાંઠે ઘોઘા આગળ નીકળી, સોરાષ્ટ્રમાંથી કચ્છ અને રાજસ્થાનના રણપ્રદેશમાં આગળ વધી, છેક પંજાબના જવાણામુખી સુધી સિસ્તરેલો છે. એ વાત, આ લેખકે, ગુજરાતમાં ખનિજ તેલની શોધના ઇતિહાસમાં સર્વપ્રથમ આગાહી રૂપે કરી હતી, જે આગાહી ત્યાર પછી ઉત્તરોત્તર ગુજરાત-સોરાષ્ટ્રમાં શોધખોળ કરતાં સાચી પડતી જાય છે; તેમ જ ભારત સરકારના તેલ અને કુદરતી ગેસ કમિશનની દેખરેખ અને રાહચરી નીચે ખોરિંગ કરી, શોધખોળ આગળ ચલાવાય તો ખંભાતના અખાતના તળિયામાં, ખંભાતના અખાતના પાણીની નીચે, તેમ જ રાજસ્થાન વિસ્તારમાં પશુ, હવે પછી એ ઉપરની આગાહી સંપૂર્ણપણે સાચી પડશે એવો દરેક સંભવ છે.

ખનિજ કાલસાની ખાણોના વિસ્તારના અસ્તિત્વ વિષે એટલું તો નિશ્ચિત થઈ ચૂક્યું છે કે, કાલ તુરતમાં સારા એવા જથ્થામાં ઊંચી કક્ષાના કિંમતીયો ક્ષેત્રો, ગુજરાતમાં રાજપીપળા પાસે અને કચ્છ વિસ્તારમાં મળી આવ્યાં છે. આ લેખક આશાવાદી બની વધુ આગાહી કરે છે કે, તેલ અને કાલસાના ક્ષેત્રો પટ્ટો, કચ્છ-રાજસ્થાનની મરુભૂમિમાંથી પસાર થઈ, પંજાબમાં જવાણામુખી સુધી વિસ્તરેલો છે અને એ કદાચત નજીકના ભવિષ્યમાં જરૂર સંબોધ પુરવાર થવાની છે.

અને એ તોલવું ઉપયોગી થઈ પડશે કે, આજે અમેરિકામાં પેટ્રોલિયમમાંથી, વિવિધ પ્રકારની પ્રતિયાઓને ઉપયોગમાં લઈને, લગભગ ૧૭૭ જેટલાં મુખ્ય કાર્બનિક રસાયણો (પ્રાથમિક, મધ્યમ અને અંતિમ પ્રકારનાં) ઉત્પન્ન કરવામાં આવે છે. પેટ્રોલિયમમાંથી મળતી પોલીઇથિલીન, એસ-પ્રકારનાં રબર, પ્લાસ્ટિસાઇડરો, પોલીપ્રોપિલીન, પોલીસ્ટાઇરિન, નાઇલોન, પેઇન્ટ ડ્રાયરો, વગેરે જેવી અતિમ નીપજોને ઉપયોગ, ધરવપરાશનો પ્લાસ્ટિક સામાન, ફિશ્મ, રેસાઓ, સલામતી કાચ, રબરની ચીખે, રમકડાં, રેફ્રિજરેટરના આગે, કોઝિમરી, ડિટર્જન્ટો, વિસ્ફોટકો, પેઇન્ટ અને વાર્નિશ, સંલેપિત સ્નેહકો, ઉચ્ચ પ્રકારનું એસોલીન, ડેહોન, રેયોન વગેરેના ઉત્પાદનમાં થાય છે. આ ખ્યેય સિદ્ધ કરવા માટે, વિવિધ નીપજોના આર્થિક ઉત્પાદનના હોડા વ્યાવહારિક જ્ઞાનની, ખાસ કરીને વિવિધ મૂલ્યવસ્તુઓના રસાયણિક વિધિઓના સંકલનને ધ્યાનમાં રાખવાની આવશ્યકતા રહે છે. પેટ્રોકેમિકલ સલાહકાર અને નિપુણો જ્યાં પેટ્રોકેમિકલ્સનું ઉત્પાદન થતું હોય અને તે ઔદ્યોગિક વપરાશ માટે, હરીફાર્થ ભાવે બજારમાં મુકાતાં હોય, તેવા પશ્ચિમના દેશોનાં એવાં કારખાનાંનો લાભો અને ગાદ ફેક્ટરી અનુભવ ધરાવતા હોય, એ જરૂરી છે.

ઓગસ્ટ ૧૯૬૧માં પેટ્રોલિયમનું ઉત્પાદન જ્યાં શરૂ થયું છે તેવા અંકલેક્ષર તેલક્ષેત્રે, અત્યાર સુધીમાં લગભગ સાડા નવ કરોડ રૂપિયાનું, ખારલાખ ટન ફૂડ ઓઈલ ઉત્પન્ન થયું છે. આ ફૂડ ઓઈલને રિફાઇન કરવા વડોદરા નજીકની કોયલી ખાતેની “ગુજરાત રિફાઇનરી” ઓગસ્ટ ૧૯૬૫થી કાર્ય કરતી થઈ જશે એવી ધારણા હતી. તદુપરાંત કડોલ પાસે મળી આવેલા તેમ જ આ લેખકે ૧૯૬૧માં ભવિષ્ય બાખેલા, ખંભાતના અખાતના તળિયામાંથી માંડીને છેક ગોવા સુધીના દરિયા કિનારાના નવા શોધાયેલા પેટ્રોલિયમ તેલક્ષેત્રમાંથી ઉત્પન્ન થનાર ખનિજ તેલને રિફાઇન કરવા, ગુજરાતમાં એક વધુ રિફાઇનરી નાખવા માટે વિચારણા થઈ રહી છે અને તે માટેના ભૂગોલિક તેમ જ સૈરિક સર્વે, ડ્રિલિંગ, ઉત્પાદન, રૂપાંતર વગેરેનો પ્લાન ઘડાઈ રહ્યો છે, અને અમલમાં મુકાઈ રહ્યો છે.

આશરે ૪૭ વર્ષ પૂર્વે, મેં કહેલા ભવિષ્યને સાચું જેવા તથા તેમાં સાક્ષીભૂત થવા હું જીવતા છું. વધુમાં, જન્યુઆરી ૧૯૬૧માં ભરાયેલી હિંદી રાષ્ટ્રીય કોંગ્રેસની ૬૬મી બેઠક વખતે પ્રગટ થયેલા “સોવેનિયર”માં કરેલી, ખંભાતના અખાતના તળિયામાંથી છેક કચ્છના રણ સુધી ફેરતી પેટ્રોલિયમ ખૂબ વિશાળ જગ્યામાં મળી આવવાની, મારી આગાહી સાચી હોવાનું સુધી જીવવાની હું આશા રાખું છું.

રશિયામાં જ્યારે ઝારશાહી હતી ત્યારે, આવી આગાહી, સેન્ટ પિટર્સબર્ગના શૂરતર-વિદ્યાના એક પ્રાધ્યાપકે કરી હતી. એમણે જણાવ્યું હતું કે, કાર્પિયન સમુદ્રને કાંઠે આવેલા બાકુ શહેર નજીક, ખનિજ તેલનો વિપુલ જથ્થો આવેલો છે; પણ એ વાત, તે વખતની ઝારશાહી સરકારે, ધ્યાન ઉપર લીધી ન હતી. તે પછી, યુ.એસ.એસ.આર.ની બોલ્શેવિક ક્રાંતિ પછી, જ્યારે જૂના હસ્તાવેગે લેનિનના જેવામાં આવ્યા ત્યારે ઉપર જણાવેલી આગાહીને લગતી કામગીરી હાથ ઉપર લેવાઈ. પણ તે દરમિયાન તો પેલા પ્રાધ્યાપક શૂરતરશાહી, વૃદ્ધ, નિર્બળ અને અધ અણુ થઈ ગયા હતા. રશિયાની નવી સરકારે, નિશ્ચય નિર્દેશી માનતા આ પ્રાધ્યાપકને શોધી લદવા અને આખી વાતની એકસાઈ કરી જોઈ,

અને કામ ઉપાડ્યું. પરિણામે ખનિજ તેલની બાબતમાં આજે રસિયા, ખીન્ન દેશો ઉપર નિર્ભર રહ્યું નથી. પણ, સ્વાયત્ત બનતાં વાહનવ્યવહાર તેમ જ ઉદ્યોગોની બાબતમાં, ગળનાપાત્ર કમ્પતિ કરી શક્યું છે.

આ લેખકે તો સાચે જ થયો જ નસીબદાર છે, કે ગુજરાતમાં તેલ અને કાલચાના અસ્તિત્વ વિષે પોતે કરેલી આગાહીઓ સાચી પડેલી જોવા છવતો છે.

ગુજરાતની જેમ, ઉપર જણાવેલાં ખીન્ન રાજ્યોમાં પણ આવી ખોજ કરવામાં આવે તો, આપણા દેશના ઉત્કલ્પણ બાવિની જરૂર કાંપી થશે એમાં શંકાને સ્થાન નથી.

English Summary

MINERAL OIL EXPLORATION IN GUJARAT

DR. K. G. NAIK,

M.A. (BOM.), D.SC. (LOND.), F.R.I.C., F.N.I.

Over some forty years ago, the writer, as Industrial Chemist, reported, as required, to the then Government of Baroda that the constituents of the Natural Gas and the Mineral Oil which oozed out from the deep boarings at the Royal Palace at Baroda, resembled in every respect, the constituents of the Gas and the American Mineral Oil, found in Texas. Simultaneously, the writer collected and thoroughly examined the Gas issuing from the vicinity of Ghogha City in the then Bhavnagar State of Saurashtra as well as from the hot springs at Unai in the Surat District. From the above findings, the writer, as a student of both Geology and Chemistry, was led to surmise that there ran an Oil and Gas belt, from Ghogha, through the Gulf of Cambay, viz., Baroda, Broach, Ankleshwar, Olpad (Surat District) to the hot water springs at Unai.

Very recently (in 1958-1960), however, the existence of Mineral Oil under pressure, has been ascertained and established beyond doubt at Lunej (Cambay), Vadsar (Baroda) and at Hajat near Ankleshwar (Broach District). The writer's predictions have thus been amply vicidicated.

Subsequent to the publication of the above-narrated account of the History of "Mineral Oil Exploration in Gujarat", the Department of the Indian Geological Survey informed that their attention to the existence of Mineral Oil in Gujarat was drawn by the then Government of Baroda, some time about 1924,

but nothing substantial was done by the Indian Geological Department, regarding either the Nature or the forecasting of the possible existence of the Mineral Oil in the huge belt extending all along, from the hot springs of Unai (in Surat District), via Ankleshwar, Baroda, through the Gulf of Cambay to Ghogha (on the opposite coast of the Gulf of Cambay), in Saurashtra, the deserts of Kutch and Rajasthan, right up to Jwalamukhi in the Punjab in the North, and through the bed of the Gulf of Cambay along the Sea Coast of Goa in the South, as then predicted by the writer, for the "first time" in the History of the "Existence of Mineral Oil in Gujarat" and as being substantiated, from time to time, by subsequent drillings actually carried out in Gujarat and Saurashtra and may be planned to be later carried out in the Gulf of Cambay.

As regards the existence of coal fields, lignite (coal) beds have recently been discovered near Rajpipla (Gujarat) as well as in Kutch. The writer is quite hopeful to predict that the oil-coal belts are likely to persist on the line, joining Lunej (Cambay) and Jwalamukhi (in Punjab), through the Gulf of Cambay and the sandy deserts of Kutch and Rajasthan.

To refine the oil found in Gujarat, the Government of Gujarat has proposed to set up two refineries for the Petroleum oil found in the Petroleum Oil field, extending from the Gulf of Cambay and its bottom, as predicted by the writer in 1961, right down the sea-coast as far as Goa.

Unlike the Professor of Geology, St. Petersburg, who predicted similar occurrence of Mineral Oil deposit at Baku (Caspian Sea, U.S.S.R.) and who subsequently retired and had become blind, the writer has out-lived and expects to witness in all liveliness, the truth of the prediction made by him some forty years ago, regarding the occurrence and finding of huge quantities of "Natural Petroleum Oil", right from under and beneath the sandy beds of the Gulf of Cambay, as already published in the "Souvenir of the 66th session of the Indian National Congress", held at Bhavnagar in Saurashtra, Gujarat State, India, in January, 1961.

RELATION BETWEEN ELECTRICAL CONDUCTIVITY AND MILLIEQUIVALENTS OF CATIONS IN SOIL EXTRACTS

R. K. SHAH *and* J. C. VORA

*Chemistry Department, University School of Sciences
Gujarat University, Ahmedabad-9*

Whitney and Means¹ were the first to use electrical resistance measurements for a quick estimation of soluble salts in soils. Electrical conductivity of soil extracts is widely used to appraise the salinity of the soils. The salinity index, as suggested by the conductance measurement, is directly related to crop growth on any soil. Hence a large amount of data, on conductivity determinations, is available for saline soils. A soil is considered to be saline, when the conductivity of the saturation extract of the soil is greater than 4 mmhos/cm., and is a limiting condition for successful plant growth.² Attempts have been made by various workers^{3,4} to correlate the concentration of salts in milliequivalents per litre or parts per million and the electrical conductivity of the saturation extract. In the case of ground waters also similar relations are arrived at.

In general the following relation is used to correlate salinity in meq./lit. and conductivity in mmhos/cm. for soil water extracts :

$$(EC \times 10^3) \times 10 \text{ at } 25^\circ\text{C} = \text{Cations in meq./litre.}$$

In fact, the above correlation has to be systematised by a more precise classification, taking into consideration, the nature of the salts and the ion concentration in the soil : water extract. In the present discussion, an attempt is made to sub-divide the concentration of salts into five different ranges and then study, how far the above relation is obeyed in these ranges.

Table I presents a summary of the data collected on the electrical conductivity and the concentration of cations per litre for saturation extract for widely varying soil types from different regions. Table II presents the relation between conductivity and salinity for various ranges and different regions, arrived at from the data summarised in Table I.

Conclusions

The relation between electrical conductivity and salinity expressed in terms of milliequivalents of cations is found to be a close one, for various types of soils examined in the present investigation in the conductivity range 7.51×10^3 to 50.0×10^3 . In soils with low salt content the relation between conductivity and salinity holds well, except in three regions. In highly saline soils, the generalised relation $10 \times (EC \times 10^3) = \text{Milliequivalents cations per litre}$ does not hold. It is likely that data on conductivity and salinity from any region will show similar characteristics. The generalised relation is not obeyed, because of the nature of the salts and their concentrations, as well as the presence of sparingly soluble materials like calcium carbonate, gypsum, etc. Hence any attempt to generalise, the relation between these two determinations must take into account the regional characteristics of the soils.

We are thankful to Professor A. M. Trivedi for his keen interest in the work.

Table I
Electrical Conductivity and Milliequivalent of Cations for Soil Extracts

Range of Electrical Conductivity $E.C. \times 10^3$ at $25^\circ C$	No. of samples examined	$E.C. \times 10^3$ at $25^\circ C$			Cations meq./litre			No. of samples from different locations						
		Min.	Max.	Aver.	Min.	Max.	Aver.	A	B	C	D	E	F	G
Less than 7.5	109	0.12	7.37	2.28	2.60	82.0	27.0	39	6	33	14	7	9	1
7.51 - 20.0	62	7.51	20.0	13.3	73.0	251	154	19	8	10	—	13	11	1
20.1 - 50.0	61	20.4	49.1	32.3	191	714	383	16	19	16	—	2	8	—
50.1 - 100	32	51.3	96.0	73.0	500	1658	948	6	21	2	—	—	—	3
More than 100	18	101	241	145	1277	6051	2745	5	9	3	—	—	—	1

Table II

Factors for the relation between $EC \times 10^3$ at 25° and Cations Meq. per litre

$$\text{Factor } (f) = \frac{\text{Cations Meq./Litre}}{EC \times 10^3 \text{ at } 25^\circ}$$

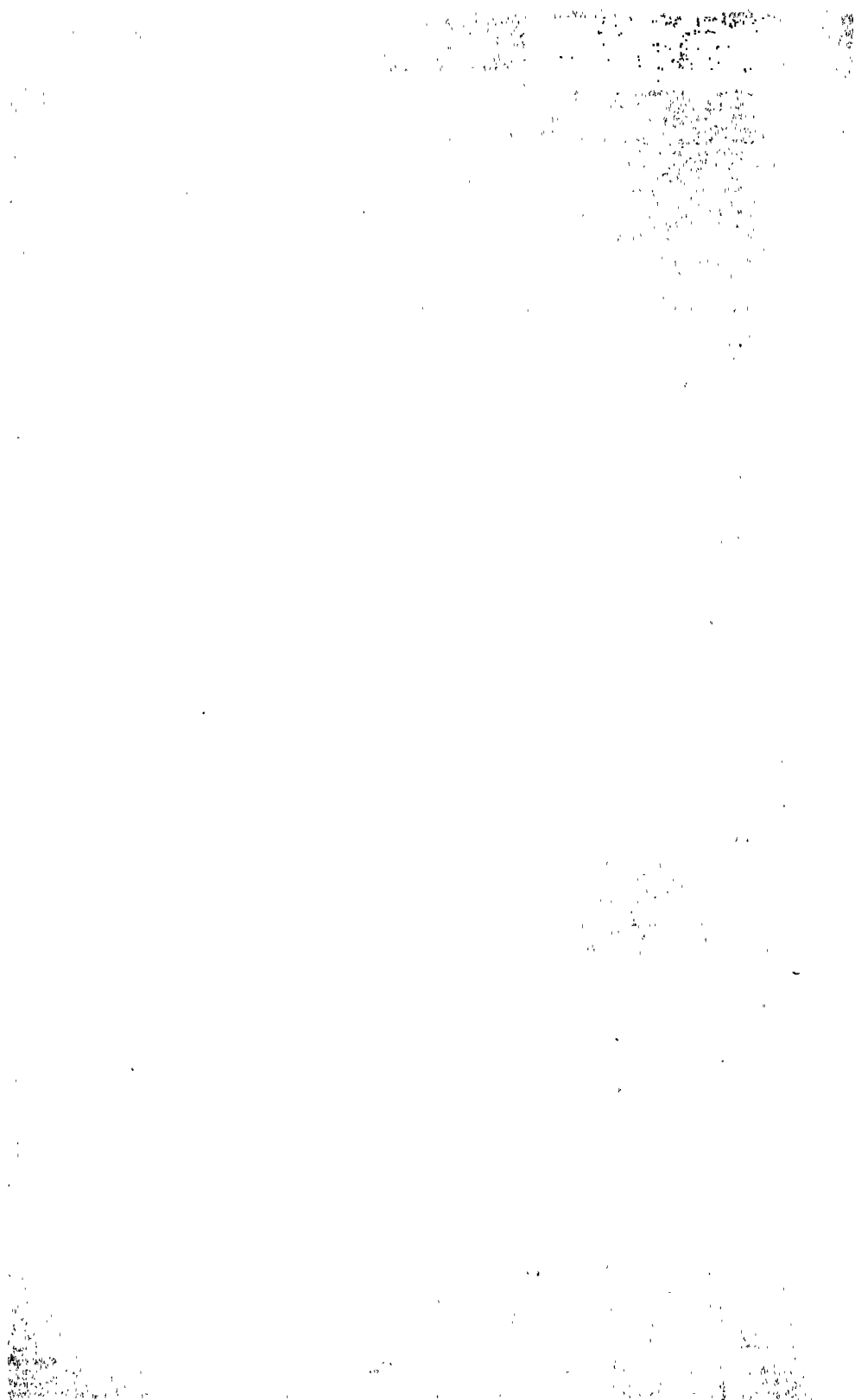
Region	$EC \times 10^3$ at 25° less than 7.5	$EC \times 10^3$ at 25° between 7.5 - 20.0	$EC \times 10^3$ at 25° between 20.1 - 50.0	$EC \times 10^3$ at 25° between 50.1 - 100	$EC \times 10^3$ at 25° Greater than 100
A	12.6	11.7	12.0	13.3	<u>23.7</u>
B	10.6	11.1	11.6	13.0	14.7
C	14.2	11.5	12.1	<u>15.2</u>	<u>20.2</u>
D	10.0	—	—	—	—
E	10.7	10.9	10.9	—	—
F	10.1	10.9	11.4	—	—
G	<u>33.2</u>	10.4	—	<u>22.5</u>	<u>22.1</u>

The table above shows that in the G region almost all the samples show an abnormality, while a similar behaviour is noticed to a lesser extent in the C and A regions, though only in the region of high conductivity. These results are shown by an underline.

- A : Dhandhuka—Dholera Region
- B : Dhandhuka—Patana Region
- C : Surendranagar—Lake Nal Region
- D : Harij—Sami Region
- E : Santalpur—Gramdi Region
- F : Piprala—Adesar Region
- G : Patdi Region.

References

1. Whitney, M. and Means, T. H., 'An electrical method of determining the soluble salt content of soils', U. S. Dept. Agr. Div. Soils. Bul. 8, 1897, p. 30.
 2. 'Diagnosis and Improvement of Saline and Alkali Soils', Agriculture Hand-book No. 60, U. S. Salinity Laboratory, 1954, p. 26.
 3. Ibid 2, p. 12.
 4. Piper, C. S., 'Soil and Plant Analysis', The University of Adelaide. Publication, 1950, pp. 30-32.
-

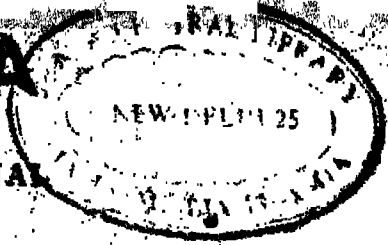


VIDYA

THE JOURNAL

of

GUJARAT UNIVERSITY



Vol. IX

August : 1966

No. 2

EDITORIAL BOARD :

Professor B. R. Shetty — Chairman,
M.A. (BANGALORE), M.Sc.
(BOMBAY) (LONDON)

Professor Umashankar J. Joshi, M.A.

Professor P. H. Prabhu,

PH.D., F.A. PSY. A. (U.S.A.), F.A.A. & L.

Professor J. J. Chinoy, M.Sc., PH.D.,

D.L.C., F.N.A.S.C.



Published by the
GUJARAT UNIVERSITY
AHMEDABAD-7

ગુજરાત યુનિવર્સિટીએ પ્રસિદ્ધ કરેલી જુદા જુદા વિષયોની

પરિભાષા - પુરિવક્તાઓ

વિષય

કિંમત

રૂ. પૈ.

(1) પદાર્થવિજ્ઞાન (પદવી કક્ષા સુધી)	૦.૫૦
(૨) શિક્ષણ	૦.૩૦
(૩) ભૂગોળ	૦.૩૦
(૪) અભિવ્યક્તિ	૦.૭૫
(૫) ભૌતિકશાસ્ત્ર	૦.૭૫
(૬) ભૂસ્તરશાસ્ત્ર	૧.૧૨
(૭) રસાયણશાસ્ત્ર (પદવી કક્ષા સુધી)	૦.૫૦
(૮) સમાજશાસ્ત્ર	૦.૫૦
(૯) વનસ્પતિશાસ્ત્ર	૦.૭૫
(10) અભિવ્યક્તિ (પદવી કક્ષા સુધી)	૧.૦૦
(11) રાજ્યશાસ્ત્ર, નાણાકીયશાસ્ત્ર અને વહીવટીશાસ્ત્ર	૦.૧૦
(12) પ્રાચીન સંસ્કૃતિ, ઇતિહાસ અને પુરાતત્ત્વ	૦.૧૦
(13) અર્થશાસ્ત્ર	૦.૮૦
(14) ધાર્મિક ઇતિહાસ અને જાતીયતાના જાણકાર	૦.૮૦
(15) આયુર્વિજ્ઞાન	૩.૭૫
(16) પ્રાણીવિજ્ઞાન	૧.૦૦
(17) મનોવિજ્ઞાન, તત્ત્વજ્ઞાન અને મુખ્ય ધર્મો ને ધર્મતત્ત્વજ્ઞાન (દ્વિતીય વર્ષ વિનયન કક્ષા સુધી)	૧.૧૨
(18) સાહિત્ય અને ભાષાવિજ્ઞાન	૦.૭૦
(19) મનોવિજ્ઞાન અને તત્ત્વજ્ઞાનની પરિભાષા (પદવી કક્ષા સુધી)	૧.૫૦
(20) સામાન્ય અને પ્રાકૃતિક ભૂસ્તરશાસ્ત્રની પરિભાષા (પદવી કક્ષા સુધી)	૧.૧૨
(21) કાયદાશાસ્ત્ર (પદવી કક્ષા સુધી)	૦.૭૫
(22) રસાયણશાસ્ત્ર (પદવી કક્ષા સુધી)	૦.૫૦
(23) ભૂગોળની પરિભાષા (પદવી કક્ષા સુધી)	૦.૩૦
(24) સમાજશાસ્ત્રની પરિભાષા	૧.૩૦

: પ્રશ્નિકા :

ગુજરાત યુનિવર્સિટી કાર્યાલય

નવરંગપુરા, અમદાવાદ-૬

CONTENTS

Sr. No.	Article	Author's name	Page
1.	Middle Indo-Aryan Miscellany	.. H. C. Bhayani	.. 1
2.	વિકાસી સીમાના સંબંધનું કાર્તિક	.. વલ્લભભાઈ ઇ. વડવા	.. 6
3.	વેદની વિવિધ વ્યાખ્યા	.. જોડાણ વા. પટેલ	.. 24
4.	Communist, Capitalist and Mixed Economics Versus Scientific Economics	.. Dr. Ralph Borsodi	.. 32
5.	Consumer Price Index Number for Ahmedabad	.. Jitendra L. Dholakia	.. 39
6.	Input and Output Trends in Indian Industries	.. M. C. Jaiswal	.. 47
7.	Indian Federalism—Problems and Prospects	.. Kirtidev D. Desai	.. 61
8.	Struggle in a Congress Session: Ideological and Procedural	.. Pravina N. Sheth	.. 100
9.	ભારતીય ઇતિહાસના કહેવાતા અધિકાર યુગ	.. ડૉ. ર. ક. ખારેલા	.. 107
10.	Some Progressive and Reactionary Features of the Pre-independence Indian Nationalism	.. P. H. Parekh	.. 118
11.	ગોખલે : ગાંધીજીના રાજનીતિ શુરુ	.. જયંતીલાલ પી. ગમ્ભીર	.. 127
12.	Idealistic Concept of Metaphysics	.. Harsiddh M. Joshi	.. 134
13.	અમદાવાદ મુખ્યત્વે નેશનલિસ્ટ વલિવર્તન —એક અધ્યયન	.. શ્રી. હરકુમારભાઈ ક. પટેલ	.. 140
14.	વિવેચ	.. સી. ઇ. વાલેશ	.. 148
15.	Mechanism of Formation of Sodium Carbonate in Soils: Role of Calcium Carbonate and Gypsum	.. R. K. Shah, J. C. Vora and A. J. Gandhi	.. 157

<i>Sr. No.</i>	<i>Article</i>	<i>Author's name</i>	<i>Page</i>
16.	On Triangular Numbers which are sums of Two Triangular Numbers	.. S. M. Shah	161
17.	Multipolar Spindles—A Meiotic Irregularity in <i>Carex Wallichiana</i> Presc.	.. C. K. Shah	164
18.	Comparison of the Bounds for the number of Common Treatments between Two Blocks of Certain Two Associates PBIB Designs	.. S. M. Shah	167
19.	A Simple Method for Calculating Dipole Moments of Diatomic Alkali Halide Molecules	.. V. B. Gohel and M. D. Trivedi	.. 171
20.	Studies in Some Varieties of Tobacco (Part IV)	.. K. A. Thaker and K. A. Patel	.. 174
21.	Chemical Properties of Coastal Salines of Cambay-Vadgam Area	.. A. M. Trivedi, R. K. Shah and A. J. Gandhi	.. 178
22.	Inhibition of the Corrosion of Copper in Ammonium Chloride Solutions	.. S. S. Rana and M. N. Desai	.. 185
23.	Properties of Negatively Charged Colloidal Iron Oxide	.. S. J. Doctor and A. M. Trivedi	.. 210

MIDDLE INDO-ARYAN MISCELLANY

H. C. BHATANI

Professor of Linguistics

School of Languages, Gujarat University

1. *uppiṭṭha-* 'frightened'

The following MIA. forms and lexical items seem to derive from the same basic root :

1. *phesa-* m. 'fright' (DN. 6, 87)¹
2. *upphesa*²- m. 'fright' (DN. 1, 94)
3. *upphesana-* 'frightening' (PSM.)
4. *upphesa-* 'emitting of a cry'
5. *ahittha-* 'angered', 'agitated', etc. (PSM.)

(It is synonymous with *uppiccha-*, *aula-* and *rosa-bhāriya-* according to the *Jīvāṇvabhiṅga* commentary as cited by PSM. In his Prakrit grammar (2, 174) Hemacandra considers *ahittha-* a *bhāṣā-sabda* i.e. a word of the spoken dialect).

6. *ohittha-* m. 'depression', 'vehemence', etc. (DN. 1, 168)³
7. *uppiṭṭha-* 'frightened', 'angered', 'distressed'
(DN. 1, 129)⁴
8. *hittha-* 'frightened', 'feeling ashamed or shy'
(DN. 8, 67)

¹ Abbreviations : DN = *Deśinā-mamālā* of Hemacandra. PSM = *Pāṭisadda-mahāṇṇavo*. DED = *Dravidian Etymological Dictionary* by Burrow and Emeneau, 1961.

² *upphesa-* 'fright' noted in PSM. from *Setu* 10, 61 seems to be a scribal mistake. See the comment further below on *uppiṭṭha-*.

³ The third sense recorded in DN. is *vicārīta* 'considered'. But the second sense *raḥḥasa* suggests that probably this should be *avicārīta-* 'thoughtless.'

⁴ *uppiṭṭha-* 'out of breath' noted in PSM. as a separate item is obviously identical with this.

9. *hiṭṭha-* 'distressed' (DN. 8, 67).

10. *avahittha-* n.; *avahittha-* (Sk.) 'dissimulation or concealment of emotion.'

If we assume an OIA. verbal base **sphis-* or something similar, we would have *phesa-*, *phesana-* from its action nouns and **phittha-* like the past participles in *-sta-*. Medially (e.g. after prepositions) it would appear as *-hittha-*, cf. *ghara-* and *-hara-*, *phala-* and *-hala-*, etc. and generally Pischel, *Prakrit Grammar*, § 184. First confined to bound positions, *-hittha-* would replace the less frequent **phittha-* occurring in free positions. Compare a similar development in the case of *ho-* 'to be', *hāvira-* 'swift runner', *ghitta-* 'thrown' (from *kṣipta-*), *indha-* 'mark' (from *cindha-* < *cinha-*) etc.

Instead of the expected form **upphittha-* (from *ud-* + **pph-*), we have *uppittha-* through dissimilation. The spelling *uppiccha-*, very frequent in manuscripts, is incorrect. We are not sure if *parihaccha-* m. 'anger' (DN. 6, 71) is the same as a wrongly recorded **parihittha-*. So also it would be somewhat risky to connect here the unexplained Sk. *saṃpheta-* 'mutual conflict of angry persons', although some support can be derived from *avahittha-* (fem. *avahittha-*; no. 10 in the list given at the outset), similarly a dramaturgical term so far unexplained and here connected with **phittha-*, *hittha-*. A further favourable point is that cerebralization is also found in *hittha-* (no. 9 in the list), which is significantly comparable to *tattha-*, *taṭṭha-* (Sk. *trasta-*). But it would be difficult to explain all the details of the development.

Guj. *phē*, *phē* 'so as to be out of breath due to fright', 'fright' is to be derived from *phesa-* (through **pheḥa-*). In the dialects in which it is current, we have *-h-* corresponding to the intervocalic *-s-* of the standard Gujarati.

* It should be noted here that Hemacandra considers *hittha-* as a development of Sk. *trasta-* through *ādeṣa*. See his Prakrit grammar 2, 136 and DN. 8, 67 (commentary).

2. *gomṭhi* 'a cluster of blossoms' and related words

DN. 2, 95 notes four words with the sense 'blossom' (*mañjarī*): *gocchā*, *gomṭhi*, *gomṭi* and *gomji*. DN. 2, 34 notes one more, *gomṭi*, in the same sense. *guccha-* with the variants *gumcha-* and *goccha-* (and possibly *gomcha-*) means 'cluster' 'bunch' (of leaves, flowers, etc.). *gumḍa-* (with the possible variant *gomḍa-*) too has the same as one of its meanings, as attested in *kesara-gumḍa* 'clusters of *kesara* blossoms' (*śakuntala*). So *gocchā* (v.l. *gomcha*) 'blossom' is genetically the same as *guccha-* 'bunch'.

The same applies to the original meaning of the other synonyms of *gocchā*. The development from the sense 'a cluster' in *guccha-/goccha-*, *gumḍa-/gomḍa-* to 'a cluster of blossoms' in *gocchā-/gomḥā-*, *gumḍi-/gomḍi-* can be easily conceived, especially with the help of the occurrences like *kaṣai-kusuma-goccho* (*Lilavāṭī*, 771) 'a cluster of creeper-blossoms.' *gomji* (Sk. lexical *guñjā-*) appears to be a peculiar development of *gumḥa-/gomḥa-*. Trivikrama's Prakrit grammar (3, 4, 72) gives *gomḥi*, *gomḥi* and *gomji* with the meaning 'blossom'. But *gomḥi* is not possible, and so it is preferable to read *gomṭhi*, *gomḍi* and *gomji* on the basis of the recorded variants.

Dhanapāla's *Paṭalacchī* (345) has noted the words *tomari-gumḍi* and *mañjarī-gumḍi*. Bühler understands these in the sense of 'pollen of creepers', while Doshi and Sheth (PSM.) take them to mean 'a kind of creeper'. Now DN. 5, 7 has *tomari* 'a creeper'. This leads us to doubt the above interpretations. In the light of *gumḍi* 'blossom' of DN., it appears that the *Paṭalacchī* words are to be taken not as two, but four synonymous expressions and the first *gumḍi* is possibly a corruption of *gomṭhi*, (cf. *gomṭhi* above). So we shall have *tomari*, *gomṭhi*, *mañjarī* and *gumḍi* all with the same sense.

Taking into consideration the frequent scribal confusion between the letters for *ta*, *pha*, *ḍa*, *ḍha*⁶, we can take *gomṭhi* as

⁶ For the *Deśināmāla*: see Bhayani, *Studies in Hemacandra's Deśināmāla* (1966, Varanasi), p. 16.

an orthographic variant of *gomdi*. So there remains with us *gomdi* and *kumdi*.

But besides the words for 'blossom' noted at DN. 2, 95 and 2, 34 we have one more closely similar word, used in Prakrit and Apabhraṃśa literature but somehow not recorded by Hemacandra. The word is *gomda* (variants *gunda*-, *gomdi*, *gundi*').

We note here a few occurrences : *Kuṇḍalayaṃalā* 32, 33 (*gomdi*); *Lilavatī* 80 (*gundi*; v.l. *guccha*); Puṣpadanta's *Mahāpurāṇa*, 69, 4, 3⁷ (*gomda*; v.l. *gomdi*, *goccha*); 83, 9, 7 (*gomda*; v.l. *gunda*, *godi*, *gomde*); Puṣpadanta's *Nāyakaumaracarit* 1, 6, 12 (*gomda* as a variant of *goccha*).

This *gomdi* we can take as a development of *gomdi*. For ultimately the word is to be derived from some Dravidian source. cf. Kan. *konde*, *gonde* 'tuft', 'tassel', 'cluster'. For cognates see DED. no. 1733 *kontai*. For Prakrit dentalization of a post-nasal cerebral evident in the presumed development *gomdi* > *gomdi*, compare the following:

Kan. *tonde*, *konde*⁸ : Pk. *kundira* 'Momordica monadelpha' (DN. 2, 39)

Kan. *ceṇḍu*, *caṇḍu*, *seṇḍu*⁹ : Pk. *jheṇḍuya*-, *jhiṇḍuya*-, *jhiṇḍuva*¹⁰ - 'a play ball'

Sk. *taṇḍula*:- Pk. *taṇḍula*-'rice'.

Sk. *caṇḍila*:- Pk. *caṇḍila*-'barber'

Pk. *hiṇḍol*¹¹ : Pk. *hiṇḍol*-, Sk. *hindol*-'to swing'.

⁷ With the passage here (*māyaṃda-gomda-gomdaliya-sut*), cf. the passage *māyaṃda-gomcha-gomdaliya-kīrti* at *Mahāpurāṇa* 1, 3, 7.

⁸ DED., no. 2880 *tonjai*.

⁹ DED., no. 2275 *ceṇṭu*.

¹⁰ See Svayambhū's *Paumacartu* 19, 15, 5; 23, 4, 8; 62, 8, 9; 77, 10, 2; Puṣpadanta's *Mahāpurāṇa* 1, 16, 10; 22, 7, 7; 35, 12, 1, 83, 4, 3; 85, 6, 13; 85, 11, 5; 93, 7, 3. Besides there also occurs *jheṇḍua*, DN. 3, 59 (variants: *jheṇḍua*, *jhaṇḍua*-, *jhaṇḍua*-, etc.).

¹¹ Cf. *hiṇḍ* 'to wander'.

Pk. *budḍi* - 'to submerge' Pk. *bundira*¹², 'buffalo'
budḍira - 'submerging': Pk. *bundi* - 'pig.'
 'buffalow'

In the above-cited parallels it should be noted that both the Dravidian loans in Prakrit confirm the dental treatment of an original post-nasal cerebral.

The origin of the remaining *kumti* also is to be traced to the Dravidian. We can compare it with Kan. *kottu*, *gutti*, Tam. *kontu*, *kottu*, Tel. *gottu*, etc.¹³ with the meaning 'a cluster of blossoms'.

¹² See, *Studies in Hemacandra's Deśināmāvalī*, p. 43, 44 (no. 207, 210).
 Pk. *bhuṇḍa* - and *bhuṇḍira* - 'pig' are also to be taken here into consideration.

¹³ DED. no. 1741 *kottu*.

વિક્રમેર્વશીયના સર્જનનું દર્શન

વસંતરાય છ. પંડ્યા

સંસ્કૃતના અધ્યાપક, ગુજરાત કોલેજ, અમદાવાદ

કાલિદાસના શાકુન્તલે વિશ્વભરના અનેક સમર્થ ચિંતકોને નાટકમાં પ્રતિબિંબિત થતા દર્શનને પામવા અને પોતાને લાધેલી રસાનુભૂતિને અન્યને પહોંચાડવા પ્રેર્યા છે. વિક્રમેર્વશીયને સહસ્ર સમીક્ષકોની તર્ક-સરણિ પર ચડવાનું અને તેજદાર થવાનું આવું સહસ્રાબ્દ યોધું સાંપડ્યું છે એ હકીકત છે. પરંતુ એના પરથી રખે આપણે એવું માનીએ કે આ નાટકમાં અન્તાઃસર્વ યોધું છે. શાકુન્તલમાં જેનો બલ્ય અને આંખોને આંજી દે તેવો અભિચ્છિન્ન અને પરિપૂર્ણ ઉન્મેષ દેખાય છે તે જ પ્રતિભા અહીં મૃદુ છતાં મનોરમ રીતે પાંચરી રહી છે. વિક્રમેર્વશીયમાં કવિને જે દર્શન લાધ્યું તે જ દર્શન શાકુન્તલમાં વધુ વૈભવવંતું અને વ્યંજનાભર્યું બન્યું છે. અને આ છે માનવની — માનવભાવનાઓની — ઉદાત્તાનું દર્શન. માનવીની ઉદાત્તા અન્તઃશક્તિથી જોવી અને એનું ગાન કરવું, ગોરવ કરવું એ જ ભણે કે સર્જકના સર્જનનું પ્રેરક અને પ્રામલ્ય ઉભય ના હોય! શાકુન્તલમાં થી રીતે કવિએ માનવભાવનાઓની ઉદાત્તાનું ગાન કર્યું છે એ અન્યત્ર દર્શાવાયું છે. અહીં થી રીતે આ દર્શન વિક્રમેર્વશીયમાં અભિવ્યક્ત થયું છે તે આપણે વિચારીશું.

વિક્રમેર્વશીયના સર્જકના દર્શનને પામવા સૌપ્રથમ આપણે આ નાટકની ઉપાદાનભૂત સામગ્રી તરફ નજર કરવી રહી. વિક્રમેર્વશીયની કથાનાં મૂળ ઋગ્વેદના દશમા મંડળના પુરૂરવા અને ઉર્વશીના સંવાદ-સૂક્તમાં^૧ તેમ જ આ સૂક્તની કથા જ્યાં વિસ્તૃત અને પ્રકટ અર્થવાળી કરવામાં આવી છે તે શતપથ બ્રાહ્મણના^૨ પુરૂરવા-ઉર્વશી આખ્યાનમાં રહેલાં હોવાનું સર્વવિદિત છે. અનુવેદિક તેમ જ પૌરાણિક સાહિત્યમાં^૪ આ કથા અનેક રૂપાંતરોને પામતી આવી છે. પરંતુ એવું માનવાને કારણ છે કે મત્સ્ય, પદ્ય વ્યાદિ પુરાણોમાંની આ કથા જે વિક્રમેર્વશીયની કથાની ઘણી જ નજીક આવે છે તે સંભવતઃ કાલિદાસની અગર

૧. જુઓ “શાકુન્તલની સમીક્ષાનો એક ઉપેક્ષિત પ્રસંગ” એ મથાળાવાળો લેખ — ‘સંસ્કૃતિ’, ઓગસ્ટ, ૧૯૬૪.

૨. ઋગ્વેદ, X 95.

૩. શતપથબ્રાહ્મણ, V 1-2.

૪. જુઓ હૃદનોટ્સ નં. ૩ અને ૪, page XXXIX of Sāhitya Academy edition by Prof. H. D. Velankar (First edition 1961).

તેથી જ કહ્યું છે કે, 'તેથી અહીં એ માત્ર કહેવું અને કાલકુળ આપનારની સંખ્યાનો જ વિચાર કરવો અને ઉચિત વેષાગ્ર આ કથાનો આપણને આવશ્યક કારણ નીચે પ્રમાણે છે :

"આનંદરાજ પુરુષના પ્રેમમાં પડેલી ઉર્વશી, સગળે, વચ્ચેની વચસ્થામાં એકાં પેતે સ્વર્ગમાં પાછી આવી જતી તેવી શરતપૂર્વક પુત્રી પર રહેવા આવે છે. વધેને સ્વર્ગ સુધી લાગતાં કષ્ટ કરી ઉર્વશીના પાળેલા પેટના બચ્ચાને ચોરી જવાની ને બચાવવા પાછા કોડતા રાજાની પીઠના અમકારે વચ્ચેની કાલકુળ ઉર્વશીની નજરે પાડવાની તરફથી યોગ્ય તેઓ બનેને વિખૂટાં પાડે છે. ઉન્મત્ત બનેલો રાજા મહામહેનતે પ્રિયને સાંધી પોતાની સાથે પાછી ફરવા અનેક કાઠવડી કરે છે. પેતે ખાઈમાં પકડી મૂકેલી કે વડુઓને પોતાનો દેહ અલગ પરી દેશે તેવી પ્રતિજ્ઞાને ઉર્વશી અલગરતી નથી. કલકુળ કહે છે કે તને મારો — અરે, નારીમાત્રી — સાથે પરિચય નથી લાગતો. તું નિરર્થક નારીમાં વિશ્વાસ કરે છે, કારણ 'અંગિ'નું હવે તો નરસંઘ વડુઓના જેવું હોય છે.....નારીની સોળત હોય નહિ.'"

આમ વિક્રમોર્વશીયતી નાવિકાની પ્રકૃતિભૂત ઉર્વશી કંઠોર અને નંદોર હવેની છે એટલું જ નહિ, "નારીમાં વફાદારી, નિષ્ઠા, સતત સોળત જેવા ગુણો" નથી જ હોતા એવું કહેનારી વેદની ઉર્વશી ઓના વ્યક્તિત્વનું, એના સ્વભાવ અને વર્તનનું કેવળ હીન જ નહિ પરંતુ વિકૃત સ્વરૂપ રજૂ કરે છે. નારીની સાચી પિઞ્જન ધરાવનાર, પ્રેમ આપતમાં નારીની સંસ્કાર, નિષ્ઠા આદિને જોતાર આ કવિને દિવ્યા અને માનવના પ્રેમની વાત સુધા જતયિ નારીનો આ સ્વભાવ અને વર્તન એને શ' અપે ?! એથી જ જાણે કે આ નારીને એની એ જ વાર્તાના માળખામાં અને એના એ જ અપ્સરાના યોગિયામાં નવો પ્રાણ, નવું હવે મૂળને દિવ્યા અપ્સરાનું માનવનારીમાં રૂપાંતર સાધવા જ વિક્રમોર્વશીયનો કવિ કટિબદ્ધ થયો છે. પ્રિયતમા શરતપૂર્વક પ્રેમસંગ આધિ એ કલ્પના જ કવિને અજુગતી અને વિશ્વવાદી લાગે છે. માટે જ મહાભારતની શુન્તધાની પોતાના પુત્રને ગાદી મળે તેવી શરતને ઓડી કઈ કવિ જમર-આધાના પ્રસંગને નિમિત્ત બનાવી સ્વયંભૂ રીતે પ્રાદુર્ભૂત થતા પ્રેમને નિરૂપે છે. તો અહીં કેશીદાનવ દ્વારા થતા અપહરણના પ્રસંગની સદાય સર્થ પહેલા પસંદ પીલતી પસિની જેમ નેત્રપથને ખેલતી ઉર્વશીના "અરે, ઉપકાર હજો એ દાનવનો" એવા સહજ કવેદનરૂપે જ પ્રેમને પ્રકટાવે છે. અવપ્રસ્ત અને ખેશુદ ઉર્વશી નજરે પડતાંની

૫. મત્સ્યાદિની કથા આ પૂર્વેની હોવાનો ખીજો વિકલ્પ માન્ય કરીએ તોપણ શાપના પ્રસંગની જે બે હકીકતોનો (શુભાપવંશુદ્ધવા, ચાવત સત્ત્વિય દહંતાનો સંવેદ) અહીં વિચાર થયો છે તે કલિદાસનું મૌલિક સર્જન છે. કારણ મત્સ્યમાં અરતના કાપે ઉર્વશી લતા બનવાની વાત છે. બ્યારે અહીં તો હવેના સંપ્રેદ માટે સુરેનો શાપ જવાબદાર છે. લતામાંના રૂપાંતર માટે કુમારનો નિયમ જવાબદાર છે. ઇન્દ્રના ઉચ્છાપની વાત મત્સ્યાદિમાં નથી જ.

૬. "ન વે કૈણાનિ સદ્વાનિ સન્નિ કાલકુળાણાં દુઃસ્વાન્વેતા" Rv. X 95-15.
૭. cf. "F frailty thy name is woman" Shakespeare.
૮. "મહારાજ પ્રયુક્તસીવ પદિની" ત્રિકા. I 5.
૯. "અપહરણ કાલ દાનવે."

સાથે જ એની નાજુકતાનું જ્ઞાન પ્રેક્ષકને કરાવે છે. એની અવસ્થાની વિવરણને ઉર્વશીનું આ વર્તન અપ્સરા ૧૦ જેવું લાગે છે. વળી “અમુઃસઃ ભરી નયોઃ કે એ અપ્સરો પી રહી છે” ૧૧ એવા દ્વિર્થાં એના ઉદ્ગારમાં તેમ જ હેમકુટ પરથી અપ્સરાના પ્રસંગે ઉદ્ગારાતાં “સખી, સહેજ અસીશ કે” ૧૨માં એનું અવસ્થાનું માનુષ દેય જ દેખાય છે અને એથી જ બીજા અંકમાં પ્રેમમાં સ્થાયી થતી સ્ત્રી કેવળે — પોતાની દિવ્યતા સુદાને—વારંવાર વિસ્મરી જતી આ સ્ત્રી માટે સખીને હકોર કરાવી પડે છે, “તું તો શું મનુષ્યને પણ ટપી જવાની?” ૧૩ આમ કવિએ આ અવસ્થાના અંતરને આરંભથી જ અનેક માનવભાવોથી ધમકતું તો ક્યું જ છે તેમ જ સ્ત્રીને કે કેવળ ભોગબુખ્યા રામને સન્માર્થભાષા અને ભાવભીષા પ્રેમનું રૂપ કવિએ આપી જ દીધું છે.

એ જ પ્રમાણે મૂળમાંની ઉર્વશીને બીજો અંક એના સ્ત્રીપણને લક્ષણરૂપે કહો તે એની કઠોરતા કે “હીઓનું હૃદય વરુઓનું છે” ૧૪માં વ્યક્ત થતા એના પાપાચ્છેદનનો અપ્સરાની આ પુન્યતા અને લાગણીબીનતા અને એના અન્તરપ્રેમીની સ્વર્ણપણ અને સ્વર્ણપણની કારે રાગતી પામલ પ્રેમીની આસક્તિ, અને આ બંનેના વિરોધમાંથી ત્રીપણનું કાનુસ્ય અને તેનું કાવ્ય કવિને હેયે વર્ણવેને એનું લો બાકી મયું છે કે કવિ એને છોડી શકે તેમ નથી તો બીજી બાજુ નારીની આ કઠોરતા કવિને સાથે છે. અપ્સરાની આ કઠોરતાને કદી નાખવા કવિની કલાને કસોટી પર ચઢવું પડે છે, અને માત્રની પ્રતિક્ષા સ્થાપના કે સ્થાપના મામતા કવિને હમેશની જેમ શાપ જેના અતિ-માનુષ કે અલૌકિક (supernatural) તત્વનો આશય અહીં પણ લેવો પડે છે. શાકુન્તલમાં દુષ્યન્ત આત્માપહારી ન બને, એના મોરવને આંચ ન આવે માટે દુર્વાસાના શાપનું સર્જન કવિ-પ્રતિક્ષાએ ક્યું છે; તો અહીં ઉર્વશીની કઠોરતા ન દેખાય તે માટે કવિએ ભરતમુનિના શાપની સહાય લીધી છે. શી રીતે તે આપણે હવે તપાસીશું.

શાકુન્તલમાંના દુર્વાસાના અભિશાપની માફક અહીં પણ શાપના પ્રસંગનું દેખીતું પ્રયોજન તો નાટ્યકાર્યના વિકાસનું જ છે. અપ્સરા અને માત્રીના પ્રેમની વચ્ચે ઉર્વશીની સ્વર્ણબીનતા કે ઇન્દ્રવશતા આડખીથી રૂપ હોવાનું દેવદત્તા બીજા અંકના પ્રસંગમાં પ્રેક્ષકને જણવું જ છે. આ આડખીથી દૂર કરવાની સાથે આ શાપ-પ્રસંગ ઉર્વશીને પણ મૂળમાંની નિમ્બુરતા જેવી નિર્જાળતામાંથી ઉભારી લે છે. પરંતુ આ પ્રયોજન બહુ અકળ રીતે તેમ જ એક અઘડના નિર્દેશમાં જ સ્પષ્ટવાયું હોઈ સમીક્ષકોની નજરે એ સમયે જ ચડ્યું છે. ૧૫

૧૦. “અપ્સરેષ્વ પ્રતિભાસિ”

૧૧. “અમુઃસઃ પિવતીષ માં નસમામ્ભાન્”

૧૨. “સહિ, કિમપિ પરતોડપસર”

૧૩. “કિં પુનર્માનુષ્યં વિદમ્યસ્યે”

૧૪. જુઓ નોંધ નં. ૬

૧૫. “Being blinded with jealousy she enters the Kumāra Vana the entry into which by women was forbidden under a permanent curse of Kumāra Svāmin, in spite of her knowledge of the curse.” Prof. Velankar, Sāhitya Academy edition of Vikramorvasiyam, page XXXV.

વિશ્વેશ્વરજીવન હારે એમાં પડે છે એ ચોથા અંકની ભીતરમાં આ પ્રયોજન બહુ રીતે બપાઈને મળે છે. ચોથા અંકનું કાળ નીપજ્યું છે ઉર્વશીની હતા બની જવાની ધટનામાંથી. આ ધટનાનું સ્વરૂપ અને સંદર્ભ આપણે બાળીએ છીએ. ગાંધાર્જુના ઉત્પત્તિને સમજાવે નિહાળીને એક તોયે ઈર્ષ્યાપ્રેરી ઉર્વશી વિચારેને ચાલી ગઈ અને કુમારવનમાં પેસતા જ હતા બની ગઈ. આ ધટના થોડા પરામર્શ આપી લે છે. આ નાટકના અભ્યાસીએને વિદિત છે કે હસ્તના શાપે ઉર્વશીને કેવળ સ્વર્ગમાંથી સ્થાનભટ્ટ જ કરી છે. ૧૧ એની દિવ્યશક્તિ તો પૃથ્વી પર આભા પછી પશુ બની રહી છે. એ પ્રિયાનુપ્રસાદનત વેળાએ તિસ્સકવિષ્ણુ-પ્રચ્છન્ન રહી છે; ચોથા અંકને અંતે વાદળનું વિમાન બનાવી શકી છે; સમગ્રવિસ્થા રાખી છુપાવી શકી છે. ટૂંકમાં વિકૃષ્ટ કહે છે તેમ “સર્વ મનુષ્યમૌની સંભાવના એ દિવ્યની બાબતમાં કરો નહિ.” ૧૭ આમ એક બાજુ ઉર્વશીને દિવ્યજ્ઞાન રહ્યું જ છે તો બીજી બાજુએ પોતે જ સમગ્રનીય મહિમા પ્રસંગ પછી પોતાના હતાન્તરને સમજાવતી વેળાએ ક્ષતિ કેવળ વનમાં નારી-પ્રવેશના નિષેધની અને પ્રવેશે હતામાં ફેરવાઈ જવાના નિયમની વિગતો પશુ પોતે જ આપે છે. તો સહજ રીતે જ એવું માનવાને કારણ મળે કે ઉર્વશીને ખબર હોવા છતાં બાળીબૂળને શું ઉર્વશી વનમાં પ્રવેશી? અને જો આ બધું બાળીતી હોવા છતાંયે જો એ પ્રવેશી તો મૂળમાંની ઉર્વશી કરતાં નિષ્કૃસ્તાના અંશમાં એ દોરાવાર પશુ પાછી પડે તેવી રહેતી નથી પોતે વનમાં પ્રવેશતાં, હતામાં પરિણમશે એવી ભણ હોવા છતાં ઉદયવતી-કામુક દેખાતા પોતાના પ્રેમને નકારી કાઢવા, તરછોડવા અને જાતે હતામાં ફેરવાઈ જઈ એને ઠંડવા માગતી હોય તો એની આ આસુરી વૃત્તિ (devilish instinct) એની નિષ્કૃસ્તતા આંક આપણને કાઢી આપે છે. પરંતુ કવિને પોતાની નામિકાને આત્મ અમાનુષ વર્તન કે વૃત્તિ ધરાવતી નથી દેખાડવી અને એટલા સાદુ જ ચોથા અંકના પ્રવેશકમાં ચિત્તેઆ પાસે લેએ “ગુરુના શાપે જેનું હૃદય સંમૃદ્ધ થયું છે અને તેથી જેને દેવતાનો (કુમારનો) નિયમ યાદ નથી તેવી ઉર્વશી કુમારવનમાં પ્રવેશી.” ૧૮ — એવું કહેવસાથી પોતાના શાપ-પ્રસંગના આ પ્રયોજનની પ્રેક્ષકાને બાજુ કરે છે અને હજુ કદાચ કાંઈની નજર બહાર આ પ્રયોજન રહી જતું હોય તો તેની ફરી યાદ ચોથા અંકને અંતે રહસ્યરહેલ કરતી ઉર્વશી પાસે દેવડાવે છે: “પછી ગુરુશાપે સંમૃદ્ધ હૃદયવાળી દેવતાના નિયમને વિસરી ગયેલી કુમારવનમાં પ્રવેશી.” ૧૯ આમ ગુરુના શાપે ઉર્વશીને શુદ્ધાવામાં નાખી છે. એને આ સુદાં નથી રહ્યું કે જેમાં એ પ્રવેશી રહી છે તે કુમારનું વન છે, અને તેનો આ નિયમ છે. એ તો ઈર્ષ્યાપ્રેરી અને રોષે બળતી બીજા અંકમાં વર્ષાની ડહોળાપેલી નદીની જેમ અપ્રસન્ન બોલીનરી ૨૦ વહી ગઈ હતી, તેમ જ જઈ રહી છે. એના કમનસીબે અને કાબરસિંહાના સદ્બાગ્યે નજીકમાં જ કુમારવન આવ્યું છે. આમ ઉર્વશીના વનપ્રવેશ એ જ્ઞાનપૂર્વક કે હેતુપૂર્વક નથી પરંતુ એક કાકતાલીય ન્યાયે બનતો અકસ્માત છે — એક

૧૧. “ન તે વિષ્યં સ્થાનં મવિષ્યતિ”

૧૭. “મા મવાન્ સર્વં માનુષીયમં દિવ્યાશુ સંમાવયમ્”

૧૮. “ગુરુશાપસંમુદ્ઘ્વયા વિસ્મૃતદેવતાનિયમા.....કુમારવનં પ્રવિષ્ઠા”

૧૯. “તસોઽહં ગુરુશાપસંમુદ્ઘ્વયા” etc.

૨૦. “આહુત્યનીચ બાગમના વતાં વેલી”

દેવેયમ છે. ૨૧ આમ શાપની સહાય લઈ કવિએ ઉર્વશીને ઉઘારી લીધી છે. આમ ઉર્વશીને વનપ્રવેશ જ્ઞાનપૂર્વકનો લેખાત અને તો વેદની ઉર્વશીની એક નવી અલંકાર મળી જ કાલિદાસની નાવિકા દેખાત.

આ સંદર્ભમાં બીજો એક મુદ્દો પણ થોડી સ્પષ્ટતા માગી લે છે અને તે છે નૃપવત પુત્રનો ઉર્વશીએ કરેલો ત્યાગ. આ પુત્રત્યાગના ઉર્વશીના કાર્યને સમગ્ર દષ્ટિએ જાદિ બોનારા અનેક વિક્ષેપોર્વશીના સમીક્ષકોએ ૨૨ ઉર્વશી પર કેટલાક આક્ષેપો કરી એને ધોર અન્યાય કર્યો છે. વિદ્વાન્ એ. બી. કૃષ્ણ ઉર્વશીને સ્વાર્થી પ્રતિષ્ઠા અને માતૃવહીન ગણાવે છે. પોતાના પ્રેમી સાથે રહેવા માટે, પોતાની જાતીયશક્તિ અને તેના ભોગે ખાતર, એણે વાત્સલ્યનો અને માતૃવનો ભોગ આપ્યો છે અને સ્વાર્થને પુત્ર કરતાં વધારે મર્યાદા છે. આવા આક્ષેપોમાં કેટલું તથ્ય છે તે વિચારવું અહીં ઉચિત અને આવશ્યક બને છે. ઉર્વશી પર આવા આરોપો મૂકનારાઓએ ભરતમુનિના શાપ-પ્રસંગની ઉપેક્ષા કરી જણાવ છે. આ શાપ-પ્રસંગનું મહત્ત્વનું અંગ છે ઇન્દ્રનો ઉચ્છાપ એટલે કે ઇન્દ્રે કરાવેલ શાપની અવધિ કે એનું નિવારણ. તદનુસાર ઉર્વશીને ત્યાં સુધી જ દિવ્ય સ્થાન છેડવાનું “હતું કે જ્યાં સુધી પોતામાં ઉત્પન્ન થયેલા સંતાનનું રાજા દર્શન ન કરે. ૨૩ જે બીજીએ રાજા ઉર્વશીજાત અપત્નને જોશે તે બીજીએ ઉર્વશીને એની ઇચ્છા હોય કે ન હોય તોપણ સ્વર્ગ તરફ અને ઇન્દ્ર પાસે પાછા ફરવાનું છે. આ છે શાપની હકીકત.

આ હકીકતના સંદર્ભમાં પુત્રત્યાગની ઘટનાને વિચારવી અને સમજવી રહી. ઉર્વશી વાત્સલ્યથી પ્રેરાઈ પુત્રને પાસે રાખવા કરે તો ક્યાં સુધી અને ક્યાં બહાને એ પુત્રને પતિથી સંતાડી શકે? સંભવ છે કે ઉર્વશીમાંની માતાએ આ સાહસ ખેડવાનું પણ ઉચિત ધાર્યું હોત, પરંતુ એ તો વધુ ખતરનાક શક્યતાઓથી ભરેલું છે. કારણ કે જે ક્ષણે રાજા ઉર્વશીના પુત્રનું મુખ જોઈ જશે તે ક્ષણે એણે સ્વર્ગે જવાનું છે, અને તેમ થતાં તેણે પતિ તથા પુત્ર બન્નેને ખોવાના રહેશે. સ્વર્ગના નિયમોને પરાધીન અપસરાઓને પુરી પડતાં પોતાનાં સંતાનોને સ્વર્ગમાં સાથે લઈ જવાની મનાઈ હોવાનું પુરાણો પરથી જાણવા મળે છે. ૨૪

૨૧. “सर्वथा नास्ति विधेरलङ्घनीयं नाम येन तादृशस्यानुरागस्य अन्यादृश एव परिणामः संभूतः”

૨૨. (i) “Her magic power. . . is as unnatural as the singular lack of maternal affection which induces her to abandon forthwith her child rather than lose her husband.” The Sanskrit Drama by Dr. A. B. Keith.

(ii) “She is lacking in maternal affection, for she abandons her child rather than lose her husband.” Dr. Radhakrishnan (In his general introduction of Vikramorvasiyam, Sāhitya Academy edition, page XXV).

૨૩. “सा त्वं पुरुरवसं यथाकाममुपतिष्ठस्व यावत्स परिरुद्धसंतानो भवतीति”

૨૪. આ વિધાનમાં પ્રો. વેલ્ડરનું પણ આપણને સમર્થન મળી રહે છે. “Because she had nothing to gain from her son, nor was he to accompany her to the heaven.” Note VII 16. 3-4, page 133 of Vikramorvasiyam.

રાજાના જોડી જાણી શકાયું નહીં. આ પાપકર્મને વિદિન છે. વળી એમાં પાસે બાપી સ્નેહ એક માત્ર વિશિષ્ટ ગુણ છે. મુખ આપર પતિને કેટલેક સમય ઊઠીને પૂછીના જ કહ્યું બળવા મહેતાનાં, બળકાં સત્યવાન મુખી પશુ, સંતાલી દરવી ઉર્વશીની કાજના દરવી જ અસાધ્ય, અસાધ્યિક અને અસંહીન લાગે છે. આ નાટકની નાવિકા પ્રથમ પ્રિય છે અને પછી મતા છે એ ન જુલું જોઈએ. અરે, વાસ્તવમાં નારીમાન સુખમાં પ્રિય જ છે. માતૃત્વ એના પ્રિય પાત્રમાં કે પાંચમાં છે એવો સામાન્ય સિદ્ધાંત બહુ પર સખીએ તોમણ પતિને એકલો એકવાના આ બેખમમાં રહેલાં બન્યોનું તેમ જ પુરુષવાની ઉર્વશીનીનાની ઉત્કટતાનું એવા અંકના વિશેષ દરમિયાન અભ્યન્તરકરણ દ્વારા એક વાર એને જાત થઈ ગયું છે તે ઉર્વશીને એક સંકુચાર પશુ પતિને ઊડવાનો વિચાર છે કહે ?

આ સ્થાને વિક્રમોર્વશીનીની ગૂંચલરેલી એક સ્વસ્થાનો વિચાર પ્રસ્તુત લેખાશે. અને તે છે ઉર્વશીના આ પુત્રજન્મનો કાળનિર્ણય. વિક્રમોર્વશીના વજ્રાખરા સંપાદકોનું માનવું છે કે ક્યોર્વશીય આયુષ્ય જન્મ ત્રીજા અને ચોથા અંકની વચ્ચેના શાળામાં થયો હતો. સાહિત્ય-એકેડેમીની આ નાટકની આવૃત્તિના સંપાદક નિદેશ એ. વેલંકરના મતનુસાર, “ત્રીજા અંકમાં ઉર્વશી રાજા પાસે રહેવા આવી ત્યાર પછી પશુ લાંબા સમય સુધી બન્ને પ્રતિકાનમાં સાથે રહ્યાં. ત્યાર બાદ રાજાને નૈમિષારણ્યમાં યજ્ઞસરમાં રસાયણ જવાનું બન્યું અને રાજાની આ અનુપરિચિત દરમિયાન ઉર્વશીને પુત્ર-પ્રસવ થયો..... અને સત્રમાંથી પાછા ફરેલા રાજાને લઈ ઉર્વશી મન્વમાદન વનમાં વિહાર માટે મઈ અને કેટલાક વર્ષો ત્યાં ગાળ્યા.....” ૨૫ પરંતુ રસદષ્ટિએ અને નાટકના કેટલાક નિર્દેશો તેમ જ સ્થાનોનો સ્પષ્ટ વિચાર કરતાં આ માન્યતા બૂલભરેલી જણાય છે. ત્રીજા અને ચોથા અંકની વચ્ચે સમયનો લાંબો ગાળો કલ્પવામાં કેટલીક મુશ્કેલીઓ ઊભી થાય છે. સૌ પ્રથમ તો પુરુષવાને પોતાની વહાલસોઈ સખીને સૌંદર્ય સ્વર્ગ તરફ જવા હાજરી ચિત્ર લેખાના ત્રીજા અંકને અંતે આવતા — “વસંત પછી ઉષ્ણ સમયમાં ભગવાન સ્પર્શની પોતાને સેવા કરવાની છે. તેથી એવી રીતે આપ વર્તજો કે મારી સખીને સ્વર્ગની ઉત્કંઠા ન થાય” ૨૬ — આ શબ્દો અને તેના ભાવાર્થનો વિચાર કરતાં ત્રીજા અને ચોથા અંક વચ્ચે સમયનું સાતત્ય કવિને હજી જણાય છે. બીજા અને ત્રીજા અંકમાં વસંતઋતુનો સમય હોવાનું અતિ પ્રકટ છે. આ વસંત પૂરી થતાં ચિત્રલેખાને સ્પર્શની સેવામાં હાજર થવાનો વારો આવે છે. અને એથી આ એ મહિના ઉપરના આ લાંબા ગાળા દરમિયાન પોતે પહેલી જ વાર પોતાથી છૂટી પડતી સખીને મળી શકે તેમ નથી એટલે તેને અવિશેષ ચિંતા છે. સ્પર્શ એવા ઉમ્મ દેવની સેવાનો એનો વારો ન હોત તો પાંચ-પંદર દિવસે સખીની સંભાળ લેવા એ આવ્યા સિવાય રહેત જ નહિ. પરંતુ એના આ અર્નિવાર્ય રોકાણને કારણે એનો સખી-સ્નેહ સચિંત બની રાજાને એની મમતાપૂર્વક કાળજી લેવા વીનવે છે. ૨૭ ચિત્રલેખાનો આ સખી-સ્નેહ જ વળી પાછો ચોથા અંકના પ્રવેશમાં એને ચિંતાતુર બનાવે છે. “વહાલી સખી વખર વસંતોત્સવ વીતી ગયો એથી એની ઉત્કંઠા પ્રબળ બની છે.” ૨૮ આ કથન સ્પષ્ટ છે

૨૫. Ibid., page 133, note 15. 8-9. Prof. Velankar.

૨૬. “वसन्तान्तरे उष्णसमये भगवान् सुखी मन्वीपचरितम् ।

तत्र वा मे सखी स्वर्गस्य मोक्षच्छत्रे तथा वसन्तस्य कर्मणम् ।”

૨૭. “प्रियसख्य! त्रिमा वसन्तोत्सव आगत इति वशीव उत्कण्ठितास्मि ।”

૬ એવા અંકના પ્રવેશક દરમિયાન ત્રીજા અંકની વચ્ચે પૂરી થઈ જાય છે અને ત્યાર પછીના આ કિવસોમાં સખીના શ્રા સ્વાચ્છર છે તે પ્રતિબંધનથી વ્યવસ્થા કરી એ વચ્ચે બની છે, ત્યાં તે કુશરવનમાં જતા બની મયેશ સખી સખીની અભ્યાસિકાની એને જાણ થાય છે. એ અભ્યાસિકાના આધારે પાગમ બનેલ પુરુષના જ્યાં કેટલાક શત્રુદિવસ ઉત્તરીની સેવમાં જાય છે ત્યાં તે વર્ષના વાઙ્મે દેખા દીધી છે. ૨૮ આમ સીતલ અને એવા અંકમાં સ્વતંત્ર-ગ્રીષ્મ-વર્ષનો અવિચ્છિન્ન મનુષ્ય હોવાનું સ્પષ્ટ જણાય છે. આવી સંજ્ઞાવલ્લ કદીએ એ જ ચિત્રલેખાની સખી-ચિંતા વારતાલિક બાસે. અન્યથા વર્ષો પછી સખીની ચિંતામાં સેવકંઠ ખતલી ચિત્રલેખાનો સખીસ્નેહ કૃત્રિમ લાગે અને પહેલા તબક્કા અંગેના જોના વર્તન સાથે એનો એક નહિ બેસે. જળી મનમાદનવનમાં સતિસહાય સંભવિને લઈને ઉર્વશી નિહાર માટે મર્ષ છે એ હકીકત તેમજ “આવા પ્રદેશોમાં મહાતો સંભોમ જ મહાર્ષ” ૭૨૮ એવું સહજન્યાનું વિધાન, એ બનેનું ઔચિત્ય તે જ સમયમાં જો અભિનવ પ્રણયના પદોમાં એ બનતાં હોય. પુત્રપ્રાપ્તિ પછી પ્રણયી જોના વિહારગમન અને સંભોમની વાત કેટલી અનુભવી અને નુચિત્વ કરનારી બને! તેથી સમગ્ર દષ્ટિએ વિચારતાં પુત્રજન્મની ધન્યતાને ચોથા અંકની સમાપ્તિ અને પાંચમા અંકના પ્રારંભ વચ્ચેના ગાળામાં જ કદમવાનું સમુચિત લેખાય.

આમ વિધિની વિચિત્રતા અને વામતાએ પતિ અથવા પુત્ર બેમાંથી એકને ઊડવાની કપરી અગ્નિપરીક્ષા જેની સામે જીવી કરી છે તે ઉર્વશી પુત્રને ઊડે તેટલા માત્રથી જ એનામાં માતૃવનો અભાવ છે એમ કહેવું અણુસમજી અને અન્યાયભર્યું લેખાશે. પુત્રત્યાગ એને માટે અગતિકા ગતિ બની હતી. આમ કાળજે પથ્થર મૂકી, પુત્રને નાછૂટકે ત્યજી ઉર્વશીમાંની માતાએ કેટલી કાળજી લીધી છે તેનો વિચાર પ્રસ્તુત લેખાશે. ઉર્વશીએ કુન્તીની માત્રક પુત્રને પેટીમાં કે કરડિયામાં પૂરી નદીમાં તરતો નથી મૂકી દીધા. જ્યાં સીતાના પુત્રો કવ-કુશ મોટા થયા છે તેવા સરકારધામ જેવા આશ્રમમાં—અવનના આશ્રમમાં—ઉર્વશીએ પુત્રને મૂક્યો છે એટલું જ નહિ, ઉર્વશીમાંની માતાએ નવજાત શિશુની આવશ્યકતાનો વિચાર કરી જ્યાં માતૃવની દૃઢ મળાવી શક્ય છે તેવી એક નારીને—ધાત્રી સત્યવતીને—એણે પોતાના જાતકને સોંપ્યું છે. આ કાળજીમાં માતાનું હૈયું જ ધમકી રહ્યું છે. માત્ર સંયોગવશ ઉર્વશીને લાચાર બનીને પોતાના માતૃવને મૂરઝાવી નાખ્યું પડ્યું છે. એનું આ લારેલું માતૃવ દશ-પ્રાર વર્ષના લાંબા ગાળા પછી પણ પાંચમા અંકમાં આપુના દર્શને ઊભરાઈને બહાર આવ્યા વગર રહી શક્યું નથી. આટલા લાંબા ગાળે પણ સ્તનથી વક્ષઃસ્થળને બીજવતી નારીમાં ૨૮જ માતા નથી એમ કહેવું કેટલે અંશે યોગ્ય કહેવાય? આ રીતે શાપની ધન્ય દારા ઉર્વશીને સંભવિત નિધુરતાના અને માતૃવહીનતાના આરોપોમાંથી ઉત્તારી લઈ કવિએ પોતાની માનવમૌરવ માટેની મમતા અને પક્ષપાતને સાચવી રાખ્યાં છે.

ઉપર જોયું તેમ મૂળમાંની ઉર્વશીમાં દેખાતી કઠોરતાને કાદી નાખવા કાલિદાસે શાપની ધન્યતાનું આયોજન કર્યું છે. ઉર્વશીનું આ રૂપાંતર, એનું માનવમૌરવ તરીકેનું

૨૮. “પ્રિયતમામચ્ચેવચન... બહોરાત્રાચતિવાહકતિ... દુતેજ... મેષોદયેન અગ્નિકારો અગ્નિવતિ...”

૨૯. “સતિ, જ સંયોગો વસ્તાદ્યોઽપ્ર પ્રવેસોઽ”

૨૯(બ). વિક્રમ. V 12.

વર્તન એ આ નાટકની સ્થિતિ સ્વીકૃત છે. નાટક-સંસ્થાના આરંભ પહેલાં જ, અવિનિર્મિતતાએ, એની અવિનિર્મિતતાએ, માનવજાતીના સામાન્ય જીવન વિશેની એની સમજણ, આ રીતે સ્થાપિત થઈ છે — એ કાર્ય નાટકકારે નેપથ્ય પાત્રના સાધેલ સ્થિતિ જેવું છે. ૩૦ પરંતુ નિઃશ્વેતકાવ્યના નેપથ્યની આગળ, પ્રેક્ષકોની નજર સમક્ષ ઉર્વશીના અગિયારવા એક બીજા રીતે રખાય છે. વિઠ્ઠલોર્વશીયનું સામ્યજન એવું આ રીતે છે; ઉર્વશીના ભાવવિશિષ્ટતાનું, એના હૃદયના સ્વરૂપને ઉદ્ધર બનાવવાનું, એના અદક્ષિણ મનને બીજાને વિચાર કરવું કરવાનું અને એની પ્રેમજ્વાળાની સંસારવૃત્તિને સ્થાને સમજણ અને અભ્યંતર રાજ્યવૃત્તિનું. ક્યાં અને કઈ રીતે કવિએ આ દર્શાવ્યું છે અને સામ્ય છે તે કવિ સ્પષ્ટ કરે.

ઉર્વશીના સ્વરૂપમાં પ્રેક્ષકો આ હૃદયસ્વરૂપ, અનુદારતા..... જેવી નિર્મલતા પ્રતિ નાટકકારે એક ભર નહિ પણ અનેક વાર આપણું ખ્યાન ખેંચ્યું છે. સૌપ્રથમ તો બીજા અંકમાં બહુ જ સ્વાભાવિક અને દુઃખતાભરી રીતે કવિ આ સૂચવે છે. સભ્ય અને વિદ્યુત્ક કલાપદ્ધતિમાં સ્વસ્થતા મેડા છે. વિદ્યુત્ક પ્રિયા-મિત્રનનો ઉપાય શોધવા સમાધિમાં જીત્યો છે. સભ્ય ક્ષણિક-સ્થિતિ અભિયુક્ત થયેલી સંસારવૃત્તિને આધાર આપતી મનોનિર્મલતાની આંતર-અનુભૂતિને પામીને મૂંઝેલી મેડા છે. ૩૧ જ્યાં બન્ને અધ્ધરજો આવી આ મેડા મિત્રને નિહાળી તિરસ્કરિણી-અચ્છન્ન રહે છે ત્યાં વિદ્યુત્ક સમાધિ ખોલી ઉપાય મળી ગયાના આનંદમાં ખોલી જોડે છે: “દુર્લભપ્રિયાના મિત્રનનો ઉપાય મને સૂઝી ગયો હો.” ૩૨ આ ઉદ્ધારે ઉર્વશીનું હૃદય ફરી જોડે છે. એની સંસારવૃત્તિને કારણે એ મુઝા પ્રથમ અંકમાં, “અરે, કેવી ખાનગીની વહે છે એની બોલીમાં” ૩૩ તેમ જ “સમદુઃખિયો થઈને મને નયનોથી એ નાણે પી રહ્યો છે” ૩૪માં પોતાને લાથેલી આ પ્રેમીની પિછાનને તેમ જ અભિલાષાની સ્વભાવને વિસ્મરી જઈને એ ખોલી જોડે છે. “એવી તો વળી કઈ સ્ત્રી છે કે સભ્ય એને ઝંખે જતાં એ પોતાની બડાઈ કરે?” ૩૫ ઉર્વશીની આ અવિચ્છાસની જતિ બદલ ચિત્રલેખાને સખીને ઠપકા આપવો પડે છે. “વળી પાછી મનુષ્યને પણ (તાસ આ વર્તને) સરમાવાની કે?” ૩૬ ઉર્વશીનો આ અવિચ્છાસજન્ય ભયજન્ય ત્યારે જ દૂર થાય છે કે જ્યારે આ દુર્લભા પ્રિયા પોતા સિવાય અન્ય કોઈ નથી એવું એ જાણે છે, અને ત્યારે ઉર્વશીનું બીજું પોતાના હૃદયને વાંચતી—આત્મપરીક્ષણ કરતી એ ખોલી જોડે છે: “અરે હૃદયસ્વરૂપ હૈયા, સ્થસ્થ થા.” ૩૭ આમ આ પ્રસંગમાં કવિ ઉર્વશી પાસે જ પોતાના હૃદયની આ હૃદયસ્વરૂપને એકસર

૩૦. The change has taken place behind the curtain and before the play begins.

૩૧. વિઠ્ઠલોર્વશીય, II 9.

૩૨. “જો: ચિન્તિતો મયા દુર્લભપ્રણયિનીસમાગમોપાય:”

૩૩. અભિજ્ઞાત સત્વર્ય વચનમ્ ।

૩૪. સમદુઃખ: પિબતીવ માં નયમામ્બામ્ ।

૩૫. “કા પુનરેવા કી અનેમ પ્રાપ્તમાના આત્માનં ચિદ્વચ્ચતે”

૩૬. “કિ પુનર્માનુષ્યકં ચિદ્વચ્ચતે”

૩૭. ચિમેમિ સદસા પ્રમાવાદ્ વિદ્વન્નમ્

૩૮. “હૃદયસ્વરૂપ હૈયા સમાધિસિદ્ધિ સમાધિસિદ્ધિ”

કરે છે. ઉર્વશીના સ્વભાવમાંની આ સંશયવૃત્તિ તો વિભોવર્ચીયના હૃદયને ખેંચતી મુખ્ય નાદી જેવી છે. એના ધનકારો આમ એકાદ વારના અણસારાની જેમ જ સંભળાય તો સંભવ છે કે એની પકડ પ્રેક્ષકો પાસેથી છૂટી જાય, અને તો નાટકના હૃદયને પ્રાપ્તમાં થી પછી જવાય. તેથી તો કવિ ત્રીજા અંકમાં પણ ફરી આવી આ વાતનું વિરૂપણ હાથ ધરે છે.

અભિસારિકાના વેષમાં સગ્ગૃહ ઉર્વશી ચિત્રલેખા સાથે કેપાસ-શિખર-રા ઉત્તમ અને ધનસ પ્રાસાદ પાસે આવી પહોંચતાં, “પોતાના ચિત્તડાને ચોર ક્યાં હશે અને શું કરતો હશે?” એ પ્રભાવથી જાણી લેવા સખીને વિનવે છે. ચિત્રલેખાને, પોતાના સ્વભાવાનુસાર, આમ સાંવરિયાની શોધમાં ખાવરી બનતી સખીની મળક કરવાનું સહજ મન થઈ આવે છે, ૩૯ અને એ ગમ્મતમાં કહે છે, “તારો હૃદયચોર મનોરથલબ્ધપ્રિયાની સંમતિનું મુખ આસ્વાદતો ઉપભોગયોગ્ય સ્થાનમાં ખિરાજે છે.” ૪૦ આ શબ્દોએ ઉર્વશી જેટલા વિષાદમાં ડૂબી જાય છે. એટલો બધો પ્રકટ અને પ્રખળ એનો આ વિષાદ જણાય છે કે સામાન્યતઃ ગમ્મતને સંભાવવા ટવાયેલી આ ચિત્રલેખાને તરત જ ચોખવટ કરવી પડી છે, “અરે મુખ્યા, પ્રિયામિલનની ખીજ, વળી, કઈ ચિંતા હોય?” ૪૧ અન્યથા સખીની ગમ્મતને પારખી પોતાની વિનોદવૃત્તિને અનેક વાર—ચિત્રલેખાના પ્રથમ અંકમાંના “અરે, કાણુ (તને સમજુ:ખ બની પી રહ્યું છે)?” ના મળકભર્યા જવાબમાં, ‘સખી જ તો’ એવા, તો ફરી ખીજ અંકમાં “તારા પ્રિયતમની દૂતી બનીને હવે હું આવી છું” ના જવાબમાં “અરે આટલી જલદીથી મને છોડી દીધી કે?” એવા ત્વરિત પ્રત્યુત્તરોમાં—પરચો બતાવતી આ નાચિકા સખીના વિનોદપ્રિય સ્વભાવને વીસરી જઈને અહીં એને મંભીર અર્થમાં ધટાવી લે છે. સખીની આ મળક એને હાડોહાડ બ્યાપીને લાગી જાય છે. આ હડીકત સૂચવે છે કે પ્રેમ અને પ્રિયતમ પ્રત્યેના વહેમ અને સહેલાઈથી ગેરસમજણ કરવાની વૃત્તિ આ નારીમાં કારોભાર ભર્યા છે. જાણે કે, પોતાની સ્વભાવગત આ નિર્બંધતાને કબૂલ કરતી હોય તેમ ઉર્વશી સ્પષ્ટતાના અંતે બોલી જાઉં છે, “અદક્ષિણ મારું હૃદય વહેમાઈ જાય છે.” ૪૨ આમ અદક્ષિણ અને સંદેહશીલતા આ બે છે ઉર્વશીના હૃદયના ધર્મો. સંસ્કૃતગ્રોને, “ખીજના મનને વિચાર અને તદનુસાર વર્તન” ૪૩ એવો દાક્ષિણ્યનો અર્થ થતો હોવાનું સુવિદિત છે. ખીજના મનમાં શું છે, એ જોવાની ધીરતા તથા ખીજનો વિચાર કરી એને અનુકૂળ વર્તવાનું ઉર્વશીના સ્વભાવમાં છે જ નહિ. અને એથી જ ખીજ અંકના દેવદૂતના પ્રસંગવેળાના “આ જનને યાદ રાખવો ઘટે” એવા રાજના બ્યથિત હૈયાના ઉદ્ગારોને જાણે સદંતર ભૂંચી ગઈ હોય તેમ સખીની આ ‘મનોરથલબ્ધપ્રિયા’ની મળકમાત્રે વહેમાઈ જાય છે.

પ્રિયતમાના પ્રેમ સંબંધી આવા અવિશ્વાસ અને તેમાંથી નીપજતા સંશયની આટલી ઓળખાણ પણ કવિને હજુ ઓછી અને અધૂરી લાગે છે. ૨૫૯, કાંઈ આટલી પ્રેમક ઉર્વશીની

૩૯. “મવત્સુઃ ક્ષીજિષ્યે તાવદેતયા ।”

૪૦. “હલા મનોરથલબ્ધપ્રિયાસમાગમસુલ્લં અનુભવન્.....તિષ્ઠતિ”

૪૧. “મુગ્ધે, કા પુનઃ અન્વા ચિન્તા પ્રિયાસમાગમસ્વ”

૪૨. “અદક્ષિણં સંદેગ્ધિ મે હૃદયમ્”

૪૩. “પરજનમોઽનુવર્તનં વૈ દાક્ષિણ્યમ્”

આ નિર્મલતાને પાસેને પહેલી ન. શક્યો હોય અને પરિણામે પોતાના નાટ્યકર્મને તેમ જ નામને સમજાવ્યાં ગેરરસો ન હોય. આ તેમ ક્યારી કવિ કરી એ વાર આ જ વાતની ટોચ કરે છે. એવી બંને સખીઓ અધિકાર્ય-મૂલ પર ઊતરે છે કે તરત જ “રજની સાથે મહાપીઠા વધી રહી છે” ૪૪ તેવા નિઃશ્વાસ રાગના સંતોષ દેવામાંથી નીકરે છે. આ સાંભળતાં જ ઉર્વશીનું હૈયું આચ્છાદ્ય કંપી ઊઠે છે રાતના અર્ધવાણા, રાગના નિઃશ્વાસ અને સરળ ‘રજની’ એવા શબ્દ-પ્રયોગમાં ઉર્વશીને સંદેશતા કાસે છે. એના વહેંચી રજવાવને રજની નામની કાંઈ પ્રિય સાથેની રાગની મહોળમતની મંધ આવે છે. અને એથી આ સંશય દૂર ન થાય ત્યાં સુધી ક્ષુપાર્ધ રહેવાનું એ સખીને સૂચવે છે ૪૫ અને છેવટે “મારી આ કામગીરી દૂર કરવા સમર્થ છે કાંતો એ દિવ્યા અથવા તો...” એવું વાક્ય હજુ રાગ પૂરું કરે તે પહેલાં તો આ અસહના નાયિકાનું હીનસરવ હવ્ય “કાણે છે એ બીજી ?” ૪૬ એવી આકળામણ અનુભવી ઊઠે છે. અને એની આ આકળામણ ત્યારે જ દૂર થાય છે કે જ્યારે ‘એ અપરા પોતાની કથા જ છે’ ૪૭ એવું તે બોલે છે.

નાયિકાના સ્વભાવની એકની એક વૃત્તિનું વળી વળીને સ્પષ્ટ કરતા નાટ્યકાર વિષે શું ધારવું ? એના પ્રત્યેક પદમાં એક કુશળ શિક્ષણી સભાનતા દેખાય છે તેવા કાલિદાસ એકના એક જ અર્થને વારંવાર જ્યારે આલેખતા હોય ત્યારે જરૂર એમાં ચુરુ અને મહન ઉદ્દેશ હોવો જોઈએ. ક્યા એ મહત્વના ઉદ્દેશથી પ્રેરાર્થ કવિ ઉર્વશીના સ્વભાવની આ અવિશ્વાસ, તેમાંથી નીપજતા સંશયની અને અનુદારતાની વૃત્તિને વારંવાર સ્પર્શી રચ્યા છે ? આ પ્રશ્નના ઉત્તરને પામવા વિક્રમોર્વશીનું અપૂર્વ કાવ્ય જ્યાં વ્યક્ત થયું છે તે એવા અંકની વિરહકથા તરફ વળવું પડશે. પ્રેમ પાછળ ખોવાઈ જવાની, પામલ થવાની ને ક્યા સવાની માનવરાજ પુરવાની જે વૃત્તિ વેદની મૂળ-કથામાં કવિએ જોઈ છે તેના કાવ્યમાધુર્યથી કવિ મોહા છે. આ મોહિનીના અમૃતકુલમાંથી થોડાં અમીખિંદુઓ ઝીલીને પોતાના કાવ્યને અને કાવ્યજગતને કવિએ પરિતૃપ્ત કર્યાં જ છે. આ અલોકિક કાવ્યને જન્મવતા વિરહપ્રસંગને નજરમાં રાખી નાટ્યકારે નાયિકાની આ સંશયવૃત્તિની વાત વારંવાર કરી છે. જો ઉર્વશીની આ વૃત્તિ પ્રેક્ષકોના ધ્યાન બહાર રહી ગઈ તો આ વિરહના કાવ્યની મીઠાશ પ્રેક્ષકો ખોઈ બેસવાના. એની અણુસમજણે કે ગેરસમજણે એવા અંકની સમગ્ર રસ-મૃદિ લુપ્ત અને ભાવહીન બાસવાની. શી રીતે તે હવે તપાસીએ.

એવા અંકના વિરહનાં મૂળ છે ઉદયવતી-પ્રસંગમાં. મન્દાકિનીના કંઠિ વિહરતા આ પ્રેમીયુગ્મની નજરે કા અણુચિંતની પણ વિલાપર-દારિકા ઉદયવતી પડે છે. રાગની નજર મંજાના કાંઠા પર રેતીના પર્યંત બનાવતી ને ખેલતી આ બાલિકાની તરફ સ્થિર થાય છે. ઠીક ઠીક ક્યાંક સમય સુધી એ એને નિહાળે છે. અને બસ, અસહના ઉર્વશીની શંકાને બહાનું અને એના અવિશ્વાસને આધાર મળી જાય છે. ઈર્ષ્યા અને રોષ વશ બની સંજના સંપ્રસિતનું

૪૪. “વચસ્ય, રજત્યા સહ વિજૃમ્ભતે મદનવાવા”

૪૫. “અગ્નિસિંહાર્ચનાનેન વચનેનાકમ્પિતં મે હૃદયમ્.....વાચસ્ય: સંસાવ્યક્ષો મવતિ”

૪૬. “કા વા અપરા”

૪૭. III. 10 ટ.

સારંગર અભિસંધાન કરતી વર્ષાની વેગીલી નદીની માફકૃદ એ લેલી જમ છે. દેવમેને કુમ્ભરવન બાજુમાં છે. ગુરુશ્રપે એ મૂલ બની છે. કુમ્ભરવન-પ્રવેશનો નિમિષ જુલોને લેખાં સામ્ય છે અને પ્રવેશતાં જ લતા બની જાય છે. ૪૯

સામાન્ય રીતે આ ઉદયવતીના પ્રસંગમાં આજસુધીની વિકાસપંક્તિની સમીક્ષા કરવાને રાજાનો હોય જોવા પ્રમાણ કર્યો છે. ૪૯જ કાલિદાસના બધા નામકે મધુકર-કવિના — અનાદ્રાતપુરુષ અને અનાસ્વાદિત નવમધુ તરફ જનારા — હોવાનું આ પરંપરાએ માની લીધું છે, અને તેથી એ પૂર્વગ્રહની પકડમાં રહી બધી પુરસ્વાની કામ-અચલતા કે હાસ્યવિહાન ગીતમાં કુખ્યન્તની અચલતા વાંચવાનું તેમને સહજ અને સ્વભાવ થઈ પડે છે. પરંતુ પુસ્તકા મને અને સમગ્ર નાટકના સંદર્ભ તરફ ખુલ્લી આંખો કરી જોનાં આ માન્યતા શૂંચકારેલી હોવાનું દેખાયા વગર રહેતું નથી. જો કવિને આ પ્રસંગમાં રાજાની કામુક્તાનું સ્થાન કરવું ૪૯ હતું તો કવિ એના ઊછળતા વૌવનને કે થનમનાટને હાસ્યભાર કોઈ કીડા-બાપારમાં પરાવાયેલી ઉદયવતીને બતાવવાને બદલે એને કિશોરીને, બાલિકાને એનાં રસ પડે તેવી રેતીના પર્વતો બનાવવાની રમતમાં મશગૂલ ૫૦ કેમ બતાવતા હશે, વારુ? ચિત્રલેખા પોતાની સખીને ઊઠી ઉદયવતીમાં આસક્ત થતા રાજાને વિદ્યાધરી-કામુક કહેવાને બદલે રાજર્ષિ કેમ કહેતી હશે, વારુ? કવિની ઔચિત્યલુપ્તિમાં આપણને આસ્થા છે. વળી કવિના હરેક પદમાં કંઈ ને કંઈ સાર્થકતા આપણે જોતા આવ્યા છીએ. તદ્દનુસાર ‘રેતીના પર્વતોથી ખેલતી’ એવા ઉદયવતીના વિશેષણ દ્વારા કવિ આ વિદ્યાધર કન્યાની અવસ્થાનું, વયનું સ્થાન કરતા જણાય છે. રેતીના પર્વતોની રમત બાહ્યાવસ્થાનો જ ખેલ હોઈ શકે. એ ખેલમાં રત આ કન્યા મુખ્યાવસ્થાની કિશોરી હશે. આ વયની, આ કીડામાં મસ્ત એવી બાલિકા પર મંડાતી રાજાની નજર, કયા બાવથી પ્રેરાઈ હોય એ કહી શકાય. એ કેવળ સૌંદર્યદ્રષ્ટા (Aesthete)ની જ નજર હોઈ શકે—કામીની નહિ. કારણ કે વસંતવદનુમાં, ગન્ધમાદનવનના મોહક પ્રદેશમાં, સ્વર્ગીય ગંગાના કાંઠા પર ખેલતી આ વિદ્યાધર-દારિકા એની નિર્વાજ બાહ્યાવસ્થાને અનુરૂપ રેતીની રમત કરતી કેના નયનને અને મનને ન હરે? પરંતુ ઉર્વશી પોતાના માનવપ્રેમીની આ સૌંદર્યદ્રષ્ટાની બાવનાને સમજવાને બદલે પોતાના વહેમી સ્વભાવને કારણે બિચારા રાજાને ખોટી રીતે સમજી બેસે છે. આ સ્વપ્રતિબિમ્બનું પ્રેક્ષકાને જ્ઞાન કરાવવા માટે જ કવિએ ઉર્વશીના સ્વભાવની ઉપર જોયેલી નિર્બળતા અને સારંગર આ પૂર્વે ધ્યાન ખેંચ્યું છે. કારણ કે જો ઉર્વશીની એ સંશયવૃત્તિ પ્રેક્ષકા ન પારખી શકે તો સ્વાભાવિક

૪૮. IV. 52

૪૯. જુઓ નોંધ નં. ૧૮

૪૯(a). (i) “Even after enjoying marital life for a number of years, Purūravas could be interested in a Vidyādhara girl...” page 181. “Kālidāsa a Study” Prof. G. C. Jhaṭa.

(ii) “Kālidāsa made the vacillating king wound first his queen, on account of Urvāṣi, and then Urvāṣi on account of a strange girl.” p. 70 “Kālidāsa” by Walter Ruben.

૫૦. “સિકતાપર્વતૈઃ ક્રોડ્યન્તી વિદ્યાધરદારિકા તેન રાજર્ષિના....”

રીતે જ આ ઉદયવતી-પ્રસંગમાં રાજની નિર્બળતા જ તેઓને જોવા મળે. અને એમ થાય તો ચોથા અંકના અપૂર્વ વૈભવવંતા વિરહકાળને માણવામાં રસ-સૂતિ થાય, કસરત કે ઉદયવતી પ્રત્યે કામીની નજરે જોનાર આ એવકા પ્રિયતમની ઉર્વશીના વિરહે થતી બધા માટે કંથો મનોવૈજ્ઞાનિક આધાર રહે? રાજા રિખાય તેમાં પ્રેક્ષકોને હમદર્દી તા રહે, એ અંચલ કામી આ ચાતલાને પાત જ છે, એણે પોતે જ એને નોતરી છે એવી દૃષ્ટિ પ્રેક્ષકોની રહે જ અને તો કાળમાં રસ-સૂતિ આવે. માટે આ પરિસ્થિતિ ટાળવા, પ્રેક્ષકોને પુરૂરવાની બધામાં સંસ્પર્ધનો સૂર (ring of sincerity) સંભળાવવા તથા સહાનુભૂતિ ધરાવતા કરવા માટે જ કાન્તદેવ કવિએ પાણી પહેલાં પાણ બાંધી છે. ઉર્વશીના સ્વભાવમાં રહેલા વહેમીપણાથી પ્રેક્ષકોને ચિરપરિચિત કરી દઈ, ઉદયવતી તરફની રાજની દૃષ્ટિને મૂલ્યવાની દિશા ઓખી કરી આપી છે. ઉદયવતીને જોનાર રાજા કામી છે એવું સ્વભાવાનુસાર ઉર્વશી કાલે માની જોસે, પરંતુ કવિએ ઉર્વશીના અંતઃકરણ પર પાથરેલા આટલા પ્રકાર પછી પ્રેક્ષકોએ એવું માનવાની જરૂર નથી. તેઓએ આ બાબત શું માનવું તે માટે કવિએ 'રેતીના પર્વતોથી રમતી' આ કન્યાને બતાવી દિશાસૂચન કરી જ આપ્યું છે.

આમ રાજની અતિ કરુણ વિરહ-બધા માટે, વિક્રમોર્વશીયમાં સંચરતા આ કરુણ તત્વ- (tragic element)ના પ્રવેશ માટે ઉર્વશીના સ્વભાવની આ હીનસત્ત્વતામાંથી નીપજતી સંશયવૃત્તિ જ જવાબદાર હોવાનું કવિ માનતા જણાય છે. આ વૃત્તિને માળી નાખીને ઉર્વશીના સ્વભાવનું રૂપાંતર સાધવાનું કાર્ય કવિએ આ નાટકના ઉત્તરાર્ધમાં હાથ પર લીધું છે. માનવીના સ્વભાવમાં રહેલા દોષોનું વિરોધન અને એ રીતે સંધાતું આંતરપરિવર્તન સામાન્યતઃ બે રીતે શક્ય બને છે. એક તો એવા દોષોથી મુક્ત હોય તેવી ઉદારચરિત વ્યક્તિઓના દાખલા પરથી પ્રેરણા મેળવીને; અને બીજી રીત છે જાતે જૂલો કરી એનાં પરિણામો સહીને સુધરવાની. પહેલી રીતે થતું પરિવર્તન ઘણી વાર ઉપસક, અદ્યત્તી અને કસોટીની પળે કાચું નીવડનારું હોય છે. જ્યારે જૂલોના પરિણામે દુઃખ સહીને પ્રાપ્ત થયેલું પરિવર્તન ઊંડું, સ્થાયી અને અન્તઃસત્ત્વવાળું હોય છે. કવિએ ઉર્વશીના સ્વભાવના મૂળભૂત આ વત્તણને બદલાવવા આ બન્ને રીતોને અપમાં લીધી છે. આમાંની પહેલી રીત કવિએ અખત્યાર કરી છે વિક્રમોર્વશીયની અંતર-કથા (sub-episode) જેવા ઔશીનરીના પ્રસંગમાં. પ્રચલિત માન્યતા અનુસાર વિક્રમોર્વશીયના ત્રીજાત્રીજા અંકમાં પથરાયેલો આ પ્રસંગ નાટકના કથાપટ પર લાદેલા થીમડા જેવો મનાય છે. ત્રીજા અંકના છેવટના ભાગમાં અને ત્રીજા અંકની શરૂઆતના ભાગમાં સમાયેલા આ પ્રસંગને નથી કશું પુરઃસંધાન કે નથી કશું અનુસંધાન. આમ તાણવાણા-વિહોણો આ પ્રસંગ બહારથી લાદેલો, આગતુંક અને એથી નાટ્યકાર્ય સાથે અસંબદ્ધ હોવાનો અભિપ્રાય કથારેક ઉચ્ચારાયો છે.^{૫૧} પરંતુ આ પ્રસંગ પાછળ કામ કરી રહેલા કવિના આશયને સમજ્યા વગર આ અભિપ્રાય બપ્ત થયો જણાય છે. ઔશીનરીની કથાનું એકમાત્ર અને આખરી મૂલ્ય કેવળ સપ્તલી-પ્રસંગનું જ નથી. માલવિકાગ્નિમિત્રની માફક અંતઃપુરની સપ્તલીઓની ઈર્ષ્યા, ખટખટ કે કાવાદાવાની સૃષ્ટિમાં ડોકિયું કરાવી રાજ્યહરબારના

૫૧. "But beyond the formal removal of an obstacle in the king's love affair, her introduction does not serve any very important purpose" Velanker, *ibid*, page XXXXVIII.

વાતાવરણમાં રત લોકોનું મનોરંજન કરાવવા પૂરતો જ આ ઔશીનરીના પ્રસંગ નથી નિરૂપાયો. મનોરંજન કે અંતઃપુરની સૃષ્ટિને ચિતાર એ તો આ કવિએ એકેય સ્થાનું કે નિમિત્ત માત્ર છે. એ પ્રસંગના આયોજન પાછળ કવિનું પ્રધાન પ્રયોજન છે ઉર્વશીના સ્વભાવ પરિવર્તન માટે એક ઉજ્જવળ અને નમૂનેદાર દર્શાવે એવી સામે વર્ણનું. એના વ્યક્તિત્વની તદ્દન વિરોધી એવા ઉદાત્ત વ્યક્તિત્વની અને વર્તનની ઉર્વશીને સાક્ષિણી બનાવી એના પરથી કંઈ બોધપાઠ પોતાના માટે રજૂ કરવાનું. ઔશીનરીના સમગ્ર પ્રસંગ પરથી આ અર્થ દ્વિત થતો હોય તેવી પ્રતીતિ પ્રથમ નજરે આપણને નથી થતી એ ખરું છે, કારણ કે ઔશીનરીની કથા એના સમગ્રરૂપે તો ઈર્ષ્યા અને રોષ જેવી બીજા અંકમાં દેખાતી શક્યની માનવસહજ નિર્ભંજતાએના તેમ જ પ્રિયાનુપ્રસાદનવ્રત વેળાએ દેખાતી એની મહાનુભાવતાનો બનેલો છે. સંભવ છે કે ઔશીનરીના વ્યક્તિત્વમાં આ નિર્ભંજ અને સખ્ખ એમ ઉભય પાસાંઓનું સાથે દર્શન કરનારને ઘડીભર ઉપરથી જોતાં ભાસે કે ક્યાં છે અહીં એવું અણિશુદ્ધ અને સર્વદા આદરણીય અને તેથી અનુકરણીય નિરપેક્ષ સદૃશ્યનું દર્શાવે ?

સાચું છે કે પ્રેક્ષકને માટે નિરપેક્ષ સદૃશ્યનું દર્શાવે પૂરું પાડવાનો કવિનો અહીં આશય નથી જ તેમ છતાંયે ઉર્વશી માટે એક ઉજ્જવળ દર્શાવે પૂરું પાડવાનો જ આ પ્રસંગ પાછળ કવિનો ઉદ્દેશ હોવાનું નિર્વિવાદ છે. આ આખાંયે પ્રસંગની ગોઠવણી પાછળ કવિએ જે સાવચેતી અને કાળજી લીધી છે તેના પરથી આ હેતુ દ્વિત થયા વગર રહેતો નથી. બીજા અંકમાંની ઔશીનરીની માનવનારી-સહજ નિર્ભંજતાનું આલેખન કરતાં પહેલાં કવિએ ઉર્વશીને તખ્તા પરથી વિદાય કરી દીધી છે. ઔશીનરીની ઈર્ષ્યા અને રોષની લઘુ-વૃત્તિઓ કવિએ ઉર્વશીની નજરે પડવા દીધી નથી. એ જ પ્રમાણે ત્રીજા અંકમાં ઔશીનરીના વ્રત-સમાપન પછી ઉર્વશીને પ્રવેશ આપવાને બદલે પ્રથમ મણિહર્મ્યપૃષ્ઠ પર ઉર્વશીને હાજર કરી છે અને એની રૂબરૂમાં જ ઔશીનરીની ત્યાગવૃત્તિનું જેમાં દર્શન થાય છે તે વ્રતનો પ્રસંગ યોજ્યો છે. આમ ઉર્વશીને તો ઔશીનરીના વ્યક્તિત્વનું કેવળ ઉજ્જવલ સ્વરૂપ જ જોવા દીધું છે. અને એમ કરવાથી જાણે કે કવિનું આ પરિવર્તન માટે દર્શાવે પૂરું પાડવાનું પ્રયોજન કંઈક તત્કાલપૂરતું બર આવ્યું હોય તેવું જણાય છે. કારણ કે ઔશીનરીના આ સિતાંશુકમંડિત અને અન્તઃપ્રસન્ન વ્યક્તિત્વમાં જ્યારે ઉર્વશીને શયીની ઓજસ્વિતાનાં દર્શન થાય છે ત્યારે સખીની પાસે કવિ કહેવરાવે છે, “વાહ, તારું કહેતું અસ્યાવિહોણું છે.” પર વળી વ્રતના અંતે ફેરીના સંકેદપત્રે^{૫૩} જાણતાં ઉર્વશી જે વાક્ય બોલે છે તેમાં પણ જાણે કે નાચિકાનો આ અવિશ્વાસ દૂર થયો હોય અને તેને સ્થાને વિશ્વાસ સંચરતો હોય તેમ તે પોતે જ કબૂલે છે. “આના કહેવાનો પરમાર્થ શું છે તે હું જાણતી નથી, પરંતુ મારું હૃદય વિશ્વાસ-વિશદ બન્યું છે.”^{૫૪} આમ ઔશીનરીના આ પ્રસંગથી હાલ પૂરતું તો કવિનું આ બાવ-વિશોધન કે પરિવર્તનનું પ્રયોજન સિદ્ધ થતું જણાય છે. ત્યાગમૂર્તિ એવી ઔશીનરીના વ્યક્તિત્વનો પ્રભાવ જાણે કે આટલી વાર ઉર્વશી પર પડ્યો હોય તેમ એ એની સ્વાભાવિક

૫૨. “સાધુ । અસૂયાપરાધ્મુલં મન્નિતં ત્વયા ।”

૫૩. “અણપ્રમૃતિ ચો જિયમાયંપુત્રઃ પ્રાર્થયતે.....વર્તિતવ્યમિતિ”

૫૪. “ન જાને કિં પરમસ્યાઃ વચનમ્ । મમ પુનર્વિશ્વાસવિસદં હૃદયં સંવૃત્તમ્ ।”

અમુક એક અવિશ્વાસપૂર્ણતાથી મુક્ત થતી હોય તેમ લાગ્યા વગર એવું નથી. પરંતુ એવી મોશ્મિરી તાત્કાલિક પરથી નિવારણ છે કે તરત જ ઉર્વશી હતી ત્યાં ને ત્યાં જ આવી જાય છે હોય તેમ તેના “અરે, આ રાજાવિને એવી ખતી વહાલી લાગે છે” તે ઉદ્ગારથી સ્પષ્ટ થાય છે. અને એવી એવું મન આ રાજા સાથેના પ્રેમમાંથી કંઈક પાણું પડતું જણાય છે. પરંતુ તરત જ પોતે કહે છે તેમ “એ પોતાના હૃદયને પાણું વાળી શકે તેમ નથી” — એનો અર્થ એ જ કે એના અંતરનો એક અંશ, એમાં ભારોભાર રહેલું અદાક્ષિણ, એના આ પ્રેમ-વ્યવહારમાં સ્થિતિ આપતાં નથી.

જ્યાં વાતવાતમાં વહેમાઈ જવાનો, પ્રેમપાત્રને અગ્નિશ્વાસથી જ ભેગા કરવાનો પ્રિયાનો સ્વભાવ હોય ત્યાં આ પ્રીત લાંબો વખત ન જ નમે એમ સમજી કપિ અને સ્થિર કરતાં પહેલાં ઉદયવતીના પ્રસંગ દ્વારા કોટીએ બતાવે છે. અને એ અગ્નિપરીક્ષામાં સફળ ન થતાં ઉર્વશીને સ્વયં કાઢવાનું અને અન્યને દગ્ગાડવાનું સંકટ સ્વાભાવિક રીતે જ આવી પડે છે. કહો કે એના આરા નસીમે એ જડ લતા બની હોવા છતાંયે કોઈ અચિંત્ય રીતે—કવિની પ્રતિભાના સ્પર્શે—એને અન્ય-તરફથી દ્વારા સાક્ષી થવા જેટલી સંજ્ઞા રહે છે. અને તેથી માનવ-રાજના હૈયામાં વસોવાતા પ્રેમ-રાશિના મંથનમાંથી વારાફરતી નીસરતાં અને જીજ્ઞાસિને જિજ્ઞાસા પ્રેમ સંજ્ઞાથી જોડાયેલ, ઉત્કટતા, સમ્યક્, નિષ્ઠા, તત્પરતા, આત્મપરીક્ષણ, આત્મવિશ્લેષ, સાર્વજનિક સ્નેહ અને સાનુકૂળતા જેવાં અસંખ્ય ભાવ-રત્નોને એ જોઈ અને પારખી શકી અને એ મંથનમાંથી મળેલા અમૃતને આસ્વાદી જાણે કે એના પ્રેમમાં રહેલું સમસ્ત કાલુષ્ય—હીનસત્વતા, અદાક્ષિણ, અસ્યા, સંશયવૃત્તિ, અસંતોષ અને અવિશ્વાસ—ઘોવાઈ ગયું. લતામાંથી ફરી નારી બનતી આ અપ્સરા અંતરથી સાવ પલટાઈ ગઈ છે. ઉર્વશીનું આ બાહ્ય રૂપાંતર નાટકના સાખ્યભૂત એવા નાયિકાના આંતર-રૂપાંતરનું જાણે કે પ્રતીક ન હોય! આ રૂપાંતર સિદ્ધ થયાની પ્રતીતિ આ પત્નીના પ્રસંગમાં આપણને થયા વગર રહેતી નથી. આખી વાતનો અંતે પક્ષે રહસ્ય-રસોટ થયાથી આનંદધેરો અને સૌ પુરવા લાલમણિને પ્રિયાના લલાટ પર મૂકી એના તેજમાં ડીપી જોડના પ્રિયા-મુખની શોભાનું પાન અને ગાન કરવામાં મસ્ત છે ૫૬ ત્યાં પોતાની અને પ્રેમીની વચ્ચે કોઈ બીજાને—અરે, રજની જેવા શબ્દને—પણ આવવા દેવા નહિ માગતી, આ પૂર્વેની ઉર્વશી સાવ પલટાઈ મઈ હોય, કવિની પ્રતિભાથી પારસમણિના પ્રતીક જેવા સંગમનીય મણિના સ્પર્શે જાણે કે આમૃત અદ્ભુત મઈ હોય તેમ બોલી જોડે છે, “અરે પ્રિયવદ, પ્રતિજ્ઞાન છોડવાને આપણને ઘણો સમય થઈ ગયો છે. કદાચ પ્રકૃતિ મારી અસૂચા કરતી હશે.” ૫૭ આ શો અમકાર થયો, આ કયું ગદ્ગદ કામ કરી ગયું કે શયનમાં રતિખેદનુષ પ્રેમીને પણ જે પ્રવાસમત માની એસતી ૫૮ તે પોતે જ આજે પોતાની અને પ્રિયતમની વચ્ચે પ્રકૃતિને આપમેળે લાગી રહી છે? પોતાના નિમિત્ત ભુજપાશમાંથી, પોતાના સોનેરી પ્રેમ-પિંજરામાંથી ધડીભર પણ રાજ વેગળો ન થાય એવું મનોવલણ ધરાવતી આજસુતીની આ અસહન,

૫૫. જુઓ નોંધ ૫૨, ૫૪

૫૬. વિક્રમ. IV. 73

૫૭. “પ્રિયવદ, મહાન સ્વલ્પ કાલ આવયો: પ્રતિજ્ઞાનાન્નિમતયો: । કદાચિદ્વચિષ્ણન્તિ પ્રકૃતય: ।”

૫૮. વિક્રમ. IV. 72

અસંતુષ્ટ પ્રિયાની એવી તે કેવી કાયા-પલટ કવિએ કરી નાખી છે કે એ આપણે જ પ્રેમાર્દ્ર રાગને રાગ્યની સમસ્ત સપ્તાંગ પ્રકૃતિ—રાષ્ટ્ર, મંત્રી, પ્રજા વગેરે—નો વિચાર કરવાનું, પોતામાં કેન્દ્રિત બાનને પ્રજા તરફ વાળવાનું કહી રહી છે ?

આમ ચોથા અંકને અંતે કવિએ આ નાટકની નાપિકાને, એના પ્રેમસંબંધી ખ્યાલને, સાવ પલટાવી નાખેલ છે. અહ્યાર સુધી ઉર્વશીનો પ્રેમ પ્રમદાત્મક (possessive), અને તેથી આદાનમૂલક હતો. ઉર્વશીની પ્રીતિ એના તાત્ત્વિક રૂપમાં, પરે—પ્રિયતમે પોતામાં ને પોતામાં જ ફરતું, પુરાઈ રહેતું ને ખોવાઈ જવું એ જાતના પરવિલોપના ખ્યાલના પાયા પર જ આધારિત હોવાનું કહી શકાય. અને માટે જ જાણે કે આ પ્રેમના આવા ખ્યાલની તદ્દન વિરોધી એની ખીજ યાજુ કહી શકાય તેવા સ્વવિલોપના ખ્યાલવાળા પ્રેમનું દર્શાવતું બોલીનીના પ્રસંગ દ્વારા પૂરું પાડ્યું છે પરંતુ દર્શાવતાને જેને ન સાધી શકાય તેવી આ હ્રદયપલટાની કે સ્વભાવ ફેરવવાની વાત હતી માટે કવિ ઉર્વશીની આ પ્રેમસંબંધી અસંતુષ્ટતા કે અવિશ્વાસની વૃત્તિને જ નિમિત્ત બનાવી, ઉર્વશીને ઠોકર ખાતી કરે છે અને ચાતના સહા પછી જ એની સાન ઠેકાણે આવે છે. પોતાની અને પ્રેમી વચ્ચે કોઈ બીજું^{૧૦} આવે એ વિચાર સુધ્ધાં જેને અકળાવનાર હતો તે ઉર્વશી આ રૂપાંતરને અંતે પ્રેમીની સમગ્ર સૃષ્ટિને (પ્રકૃતયઃ) આપમેળે પોતા અને પ્રેમીની વચ્ચે નોતરે છે. કેવું આમૂલ પ્રેમદર્શિનું પરિવર્તન! કેવળ આત્મલક્ષી વૃત્તિનું પરલક્ષી વૃત્તિમાં કે પછી આદાનશીલ પ્રજુલનું પ્રદાનશીલ પ્રેમમાં ફેરું બજળ રૂપાંતર !

ઉર્વશીનું આ રૂપાંતર એટલું બધું સ્થાયી ને ચિરંજીવ બન્યું છે કે પાંચમા અંકમાં દશ-બાર વર્ષના લાંબા ગાળા પછી પણ એ ટકી રહ્યું છે એટલું જ નહિ, દિનપ્રતિદિન વધી રહ્યું છે. આ અંગેનાં સૂચનો પાંચમા અંકને પડદો ઊપડતાં જ આપણી સામે આવતા વિદૂષકની એકાકિતમાંથી મળી રહે છે. “રાજા લાંબા સમયથી મધમાદન વનમાં વિહરીને પાછો ફરી ગયો છે. હાલમાં પોતાના અનુશાસનના કાર્યથી પ્રકૃતિમંડળને રાજી કરતો રાજ્ય કરી રહ્યો છે.....” આમ ચોથા અંકને અંતે ‘સંભવ છે કે પ્રજા મારી અસુધા કરતી હશે’ એવું જે આત્મભાન ઉર્વશીને થયું છે તેનું એ આવશ્યક કરી રહી છે. મધમાદનમાં વિહાર માટે જતી વેળાએ તો જાણે કે રાજા પર પોતાની એકલીનો જ અધિકાર રહે—પ્રશુતા રહે^{૧૧} એવા ઉદ્દેશથી જ એને ‘રતિસહાય’ તેમ જ ‘રાજ્યનાં કાર્યોથી મુક્ત કરી’^{૧૨} છાઈ જતી આ ઉર્વશી આ પરિવર્તન પછી પોતાના પ્રેમીને મુક્તાપણે અનુશાસનના તેના કાર્યમાં તેમ જ રાજા અને પ્રજા વચ્ચેના મીઠા સંબંધોમાં, વચ્ચે આવ્યા સિવાય, વિહરવા દે છે એટલું જ નહિ, એની પ્રેમસંબંધી સમજણ જ એટલી પલટાઈ ગઈ છે, એનામાં પ્રેમી પ્રત્યેનો એટલો વિશ્વાસ અને સંતોષ આવી ગયા છે કે એને પ્રિયતમના સતત સંગાથ—સહચાર વગર એમાં ઊંચુપ આવશે, કોઈ બીજું જામ પડાવી જશે એવો ભય

૧૬. “આત્મનઃ સુસ્થાવસાનેન આર્યપુત્રં મિશ્રતશરીરં કર્તુમિચ્છામિ.”

૧૦. જુઓ નોંધ ૪૬

૧૧. વિક્રમ. IV. 26. C

૧૨. “उर्वशी किल तं राजर्षिं लक्ष्मीसमायम् (VL. रतिसहायं) अमात्येषु निवेशित-कार्यधुरं गृहीत्वा—विहृतं गता”

બિલ્લુલ રહી જમ્મતો નથી. આ વાત પાંચમા અંકમાંના કેટલાક નિર્દેશોથી દર્શિત થાય છે. “યોતે બસંતાન છે તેનું” રાગને દુઃખ છે—કદાચ તે નિખિતે જ આજે તિથિ-નિર્દેશ હોઈ ખવિત્ર મંચ-મુખના સંગમસ્થાને રાગ દેવીઓ સાથે સ્નાન-પૂજન માટે ગયે છે.” આ હકીકત સૂચવે છે કે આ પ્રસંગે ઔશીનરી પણ રાગ અને ઉર્વશીની સાથે છે. પતિના સર્મકાષમાં ઔશીનરી રાગની સહજમંચાલિણી અને તેમાં હવે એ પોતાના પ્રેમને આડે આવવા દેતી નથી. વળી પાંચમા અંકનું દ્વિતમ મંચાનુનાના સંગમ-કાંડા પરના કામચલાઉ પડાવ કે ડાવણી પાસે જ યોગ્ય છે આ નાનકડા પડાવમાં રાગની બાજુની જ રાવરીમાં દેવીઓનો વાસ હશે. સંગમનીય ઊપડી જવાની ખીનાએ ડાવણીમાં ઠીક ઠીક કોલાહલ જમાવ્યો જ છે. નેપથ્યમાંથી કંચુનીની ખૂંચ, તંદુમાંથી રાગનું અર્ધસંગેસા વચ્ચે સસંજમ કોડી આવવું તેમ જ વિદૂષક, સૂત, કંચુરી, કિરાતી અને ધવની વગેરેની બોલચાલ અને ધનુષ્ય એવા માટેની દોડાદોડ વચ્ચે મહિ-અપહરણની વાત ડાવણીમાં ફેલાયા વખત રહી જ ન હોય. આમ ઉર્વશીના કાન સુધી આ વાત પહોંચી હોવાની પૂરી સંભવિતતા હોવા છતાં, જ્યારે રાગ ઠીક ઠીક સંજમ અને ચિંતાતુરના કાખવે છે ત્યારે પણ ઉર્વશીનું મહિ-હરણ પ્રત્યે સચ્ચિત ઔદાસીન્ય ધણું ધણું કહી જાય છે. પૂર્ણ વિશ્વાસના લીધે આવડ અનેસા એવા સ્નેહના તાંતણે એનું અંતર રાગના અંતર સાથે એવું તો સંધારી ગયાનું તે અનુભવે છે કે એને હવે સંગમનીય જેવા બાલ અવસંબનની બહુ જરૂર રહી નથી. એટલું જ નહિ, પુત્રમિલનની વેળાએ ન્યાસ પાછી સોંપતી સત્યવતીને, “કેમ, ક્યારે, કાના કહેવાથી આ ન્યાસને પાછી સોંપવા આવી?” એવા તકબદ્ધ પ્રશ્નો પૂછવાને બદલે એટલી બધી બાવનાવશ અને બયમુક્ત રીતે વર્તે છે કે એના પ્રેમને હવે વિરહનો ભય કે ચિંતા રહ્યાં જ ન હોય. અને છેવટે સુખની પરાકાષ્ઠાની પગે જ્યારે રંભા પાસે જઈને ઉર્વશીને આ પુત્ર-પ્રાપ્તિના અને જિંદગીપર્વત પતિ-સહવાસના એવડ લાભ માટે ધન્યવાદ આપે છે ત્યારે પણ “આ અબ્યુદય સાધારણ છે”^{૧૪} એવું કહી પોતાની ઉદાર જીવન-દૃષ્ટિને જ અક્ષત કરે છે. આ સમૃદ્ધિ મારી એકંદી માટે જ નથી, એમાં દેવી ઔશીનરીનો અને અન્ય પ્રકૃતિનો હિસ્સો છે એમ માનતી અને પોતાના પુત્રને “ચાલ બેટા, મોટાં બાને પગે લાગ” એમ કહેતી આ ઉર્વશી કેટલી ઉદાત્ત, દાક્ષિણ્યમુક્ત અને ત્યાગીને ભોગવવાની વૃત્તિ ધરાવતી બની ગઈ છે.

Kālidāsa's vision in Vikramorvas'īya

Compared to Sākuntala Vikramorvas'īya has had rather the misfortune of escaping the attention of the critics and in getting its due of critical estimation. But that does not mean that the play has no intransic worth. The poet's vision of the sublime dignity of the human character reveals itself equally in both these plays. In Sākuntala the focus of the act of crea- tion was the hero, whereas here it is the heroine.

૧૩. “न सल्लु बह्विषासीन् प्रीतयः संभवन्ते ।” — उत्तरराम.भवभूति

૧૪. “ननु साधारण एषोऽभ्युदयः ।”

Urvasī of the Vedic legends is the raw material on which the vision and the art of the poet has to work. Kālidāsa is neither interested in the super-human or sub-human aspects of his characters. He is primarily interested in just the human aspect, though of course of a sublime nature. To achieve this end the dramatist has to work out a total transformation of Urvasī of the legends. Urvasī of the myths is harsh enough to proclaim, "The hearts of women are those of the wicked wolves",¹⁶ and denounce the fine feelings of Purūravas. Kālidāsa can never dream of such a heroine and hence introduces the device of Bharata's curse.

The curse is chiefly introduced with the motif of justifying both the womanhood and the motherhood of Urvasī. In the absence of the curse, the entry of Urvasī in Kumār's grove has the possibility of being construed as a deliberate act on her part;¹⁷ and in that case she would surpass the original Urvasī in the matter of cruelty and harsh-heartedness in view of what follows. But the foresight of the poet comes to her rescue. The curse makes her forget the facts of forbidden entry and its tragic consequence.¹⁸ Again the same device of curse comes to her aid at a critical point where her motherhood was at stake. Without the curse and its counter part of Indra's favour, Urvasī who abandons her newly born child would appear heartless and devoid of all motherly feelings. But she was helpless. In view of the implications of the curse,²³ the heavenly laws governing the Apsaras and in the background of her realisation of the depth of the king's love in the fourth Act, it was well nigh impossible for her to think of any other course but to keep away the child from her.

This transformation of Urvasī from a stone-hearted Apsaras into a loving and tender hearted woman is something which has been accomplished by the playwright behind the curtain and off the stage. But there occurs another, perhaps more important transformation of Urvasī, the paragon of love. Her under-

* The figures here indicate the numbers of foot-notes in the original Gujarati Article.

standing of love, her attitude towards her lover has to undergo a radical change, i.e. her entire emotional being is to be remoulded. This transformation is seen in its process as the play progresses. We see her falling in deep love with the king in the first Act. With the advance of her love in the second Act we come to know of a new trait of her character. She begins to distrust her love instantaneously.⁵⁵ Her love is easily susceptible to suspicion and doubt. This crucial trait of her character is thrice hinted at by the dramatist in the third Act even by repeating the situations.⁵⁶⁻⁵⁸ It is because of this element of distrust in her character that Urvashi misunderstands her lover's gaze at Udayavati, the Gandharva girl in the interlude before the fourth Act. The fixing of an aesthet's eye on a lovely girl of tender age,⁵⁹ is misconstrued by Urvashi as turning of the love-bee to a 'rose in bud' and this leads to the disaster in the fourth Act.

Unless this trait of her character i.e. her understanding of love or her essential nature is changed her love can not grow. To achieve this goal the poet has firstly set before her an illustrious and inspiring example of Austinari whose love finds its fulfilment in self-sacrifice.⁶⁰ But the lesson learnt⁶¹ so cheaply by this example did not last longer and hence she has been put to the ordeal of suffering by the accident that transforms her into a conscious creeper. But fortunately she regains her original form. This metamorphosis is symbolic of her redemption and re-emergence as an emotionally changed being. This change is richly suggested when at the close of the fourth Act, she of her own reminds her lover of his princely duties and thus recognises the claims of others on him.⁶²

This change endures even after a long interval of ten to twelve years in the fifth Act. Even at the highest tide of her good fortune Urvashi remembers Austinari with utmost regard and allows her happiness to be shared by her.⁶³

This magic of the twofold transformation of a super-human but shameless and selfish Apsaras into a noble and generous beloved is worked by the poet's vision of the sublime dignity of human character.

વેદની વિવિધ વ્યાખ્યા

ગૌતમ બા. પરંબ

સેંટ એલિથર્સ કોલેજ, અમદાવાદ-૬

ભારતીય સંસ્કૃતિના મહામૂલા વસિયતનામા સમા અતિપ્રાચીન ભારતીય વાક્યમને વેદિક સાહિત્ય તરીકે ઓળખવામાં આવે છે. તેમાં ઋગ્વેદ, સામવેદ, યજુર્વેદ અને અથર્વવેદનો તેમ જ બ્રાહ્મણ, આરણ્યક અને ઉપનિષદ સાહિત્યનો સમાવેશ થાય છે. હવે એક પ્રશ્ન થાય છે કે વેદ કોને કહેવાય? 'વેદ' શબ્દનો ઉદ્ભવ ધણા પ્રાચીન કાળથી ભારતીય સાહિત્યમાં થતો આવ્યો છે. સ્વયં વેદિક સહિતાઓમાં વેદ શબ્દનો પ્રયોગ આણુદાત અને અન્તોદાત એમ બે રીતે થયેલો છે. વિદ્ ધાતુને જ્યારે ભાવ અથવા અધિકરણના અર્થમાં પ્રત્યય લાગી આ વેદ શબ્દ બને છે ત્યારે તેને આણુદાત સમજવામાં આવે છે અને વૈત્તિ જેન સ વેદઃ એમ કરણના અર્થમાં ષન્ત પ્રત્યય થાય છે ત્યારે તે અન્તોદાત થાય છે એમ દયાનંદ સરસ્વતી માને છે.^૧ પ્રો. મેકડોનલ્ડ અને કૃષ્ણ વેદિક ઇન્ડોલોજીમાં બતાવે છે કે વેદ શબ્દ અથર્વવેદ અને પાછળથી શતપથબ્રાહ્મણ, નિરુક્ત વગેરેમાં 'પવિત્ર વિદ્યા' (sacred lore)નો સ્ત્રોત છે અને જ્યારે તે બહુવચનમાં વપરાય છે ત્યારે તે ઝક્, સામ અને યજુરનો અર્થ દર્શાવે છે.^૨

'વેદ'ની વ્યુત્પત્તિ આપવાનો પ્રારંભ ભારતમાં અતિપ્રાચીન કાળથી થયેલો જણાય છે. તૈ. સં. અને તૈ. બ્રા.માં તેની વ્યાખ્યા મળે છે. ત્યાં √વિદ્-જ્ઞાને (૬ઠ્ઠો ગણ ઉભયપદી) પરથી તેની વ્યુત્પત્તિ થતી દર્શાવી છે અને રીકાકાર ભટ્ટભાસ્કર √વિદ્-જ્ઞાને (૨જો ગણ પરસ્મૈપદ) પરથી ધણુ વેદ શબ્દ વ્યુત્પન્ન કરી બતાવે છે.^૩ આ રીતનો અર્થ અન્યત્ર

૧. જુઓ : 'વૈદિક વાક્યમ કા ઇતિહાસ', પ્રથમ ભાગ — મગવહત્ત, પૃ. ૧૪૦.

૨. Vedic Index, Vol. II, p. 325.

૩. વેદેન વૈ દેવા : અસુરાણાં વિતાં વેદમવિન્દન્ત તદ્વેદસ્ય વેદસ્વમ્ । તૈ. સં. ૧-૪-૨૦. વેદિર્વેદેભ્યો નિલાયત । તાં વેદેનાન્વવિન્દન્ । વેદેન વેદિં વિવિદુઃ પૃથિવીમ્ । તૈ. બ્રા ૩-૩-૬-૧૬. ભટ્ટભાસ્કર તૈ. સં. ના અર્થ ખાટે લખે છે - વિવિદેન્તેન્તેનેતિ કરને ષ્ । ઉચ્ચવિદ્વાદન્તોદાતમ્ ॥ અને તૈ. બ્રા. ના અર્થ ખાટે લખે છે. વિવિદુઃ = લઙ્ચવન્તઃ । વળી તૈ. સં. ૩-૩-૪-૭ ના બાબમાં તે નોંધે છે - પુરુષાર્થનાં વેદયિતા વેદ ઉચ્યન્તે ।

જુઓ : વૈદિક વાક્યમ કા ઇતિહાસ, મગવહત્ત, પૃ. ૧૪૧.

પશુ દર્શાવે છે. આ √ વિદ-જ્ઞાને (૨જો ગણ, પરસ્પૃષ્ટ) પરથી જે વેદ શબ્દ નિષ્પન્ન થાય છે તેનો અર્થ 'જ્ઞાન' થાય અને એ અર્થ ધણુ વિદ્યાનોએ માન્ય સમજે છે. વિદ્ ધાતુ જે ઉપરથી વેદ શબ્દ થયો છે એ લૅટિનનો *videre=to see* ધાતુ છે. આ ધાતુ પરથી જ અંગ્રેજી Idea શબ્દ ઊતરી આવ્યો છે. માટે વેદ = Vision અથવા Idea થઈ શકે.

આયુર્વેદમાં અને નાટ્યશાસ્ત્રમાં 'વેદ' શબ્દનો પ્રયોગ થયેલો જોવા મળે છે. આયુર્વેદમાં તેની વ્યુત્પત્તિ √ વિદ-સત્તાયામ્ (૪થો ગણ, આત્મસ્પૃષ્ટ) પરથી અને √ વિદ-લામે (૬જો ગણ, ઉભયપદી પરથી દર્શાવી છે.^૧ સુશ્રુત સંહિતા પર દીક્ષ કરનાર ડાહ્યુ વેદ શબ્દના બીજા એ અર્થો દર્શાવે છે અને ત્યાં 'વેદ' શબ્દની વ્યુત્પત્તિ √ વિદ-જ્ઞાને ૨જો ગણ પરસ્પૃષ્ટ અને √ વિદ-વિચારણે (૭મો ગણ, પરથી પશુ થયેલી ગણાવે છે.^૨ નાટ્યશાસ્ત્ર ૧-૨ પરની ટીકામાં અભિનવશ્રુત વેદ શબ્દના સત્તા, લાભ અને વિચાર એમ ત્રણ અર્થો ગણાવે છે. ૭ આ અર્થો અનુક્રમે √ વિદ-સત્તાયામ્ (૪થો ગણ), √ વિદ-લામે (૬જો ગણ) અને √ વિદ-વિચારણે (૭મો ગણ) પરથી ઊતરી આવેલા છે. આ અર્થો પરથી દક્ષિત થાય છે કે મૂળમાં √ વિદ-જ્ઞાને પરથી ઊતરી આવેલ 'વેદ' શબ્દને અનેક રીતે ઘટાવીને તેની વ્યુત્પત્તિ જુદા જુદા અર્થવાળા √ વિદ ધાતુ પરથી થતી દર્શાવી છે.

આ બધા અર્થોનું સંકલન કરતા હોય તેમ શ્રી. દયાનંદ સરસ્વતીએ વેદ શબ્દની વ્યુત્પત્તિ ૨જા, ૪થા, ૬જા, અને ૭મા એમ ચારે ગણના √ વિદ ધાતુમાંથી કરી બતાવી છે.^૮ જેનાથી સર્વે મનુષ્યો સત્યવિદ્યા જાણે છે, જેમાં બધી સત્યવિદ્યાઓ રહેલી છે, જેનાથી સઘળા વિદ્યાઓ પ્રાપ્ત થાય છે અને જેના દ્વારા સત્યવિદ્યા વિચારીને મનુષ્યો વિદ્યાન થાય છે તે

૪. પ્રત્યક્ષેણાનુમિત્યા વા ચસ્તૂપાયો ન વિચતે ।

एतं विदन्ति वेदेन तस्माद् वेदस्य वेदता ॥

બળી,

नेन्द्रियाणि नानुमानं वेदा ह्येवैनं वेदयन्ति ।

तस्मादाहुर्वेदा इति पिप्पलादश्रुतिः ॥

—'વિષ્ણુતરવનિર્ણય'માં આનંદતીથં

૫. आयुरस्मिन् विद्यतेऽनेन वा आयुर्विन्दतीत्यायुर्वेदः ।

—સુશ્રુત-સૂતરચાન, ૧-૧૪

૬. आयुरस्मिन्नायुर्वेदे विद्यते अस्ति...विद्यते ज्ञायतेऽनेन...विद्यते विचार्यतेऽनेन वा...आयुरनेन विन्दति प्राप्नोति इति वा आयुर्वेदः ।

—ડહહણ, જુઓ. વૈ. વા. ૬., મગવહત્ત, ૫. ૧૪૧

૭. नाटयस्य वेदनं सत्ता लाभो विचारश्च यत्र तन्नाटयवेदं शब्देन...उच्यते ।

—અભિનવશ્રુત

૮. विदन्ति जानन्ति, विद्यन्ते भवन्ति, विन्दति अथवा विन्दन्ते लभन्ते, विन्दन्ति विचारयन्ति सर्वे सन्तुष्टाः सर्वाः सत्यविद्या कैयेषु वा तथा विद्यासम्ब भवन्ति ते वेदाः ।

—દયાનંદ સરસ્વતી-આર્યસામ્યમિત્રા

જુઓ : વૈ. વા. ૬. મગવહત્ત, ૫. ૧૪૩.

વેદ કહેવાય, આમ તેઓનું માનવું છે. તેમણે ✓વિદ્-જ્ઞાને, ✓વિદ્-સત્તાવાદ, ✓વિદ્-જ્ઞાને અને ✓વિદ્-વિચારને. આમ આરે અર્થોના ધાતુઓને 'વેદ' શબ્દનું મૂળ માન્યા છે. આ તો માન્યતાથી લગાડી દીધેલા અર્થો જેવું નથી લાગતું? આટી ધાતુના પ્રચલિત હોવા તે બધા અર્થો પરથી અર્થ ઘટાવવાની પદ્ધતિ ભારતમાં પ્રાચીન સમયથી પ્રચલિત છે. એક ઉદાહરણ અસ્થાને નહિ લેખાય. ઉપનિષદ શબ્દ રૂપ+નિ+સદ્ પરથી આવ્યો છે અને તેનો પાત્રર્થજન્ય અર્થ 'નજીક બેસવું' એવો થાય. શંકરાચાર્યે તેની વ્યાખ્યા ✓સદ્ દેહો મણુ પરસ્મેપદના વિશરણુ, ગતિ અને અવસાદન એ ત્રણે અર્થો સ્પર્ધા કરી છે.^૯

હવે એક પ્રશ્ન થાય કે 'વેદ' શબ્દનો વ્યુત્પત્તિજન્ય અર્થ જ્ઞાન થાય તો શું ઋગ્વેદ વગેરે ગ્રંથોનો અર્થ જ્ઞાન કરવાનો છે? ના, એવું નથી. જ્યારે આપણે આયુર્વેદનું એમ કહીએ છીએ ત્યારે વાસ્તવમાં ઘી એ આયુષ્ય નથી પણ આયુષ્યની વૃદ્ધિનું કારણ છે. તેમ ઋગ્વેદ વગેરે ગ્રંથો એ જ્ઞાનની પ્રાપ્તિનું કારણ બનતા હોવાથી વેદ એટલે જ્ઞાન તરીકે ઓળખાય છે. આમ કહી શકાય કે જે વિદ્યાર્થી યથાર્થ જ્ઞાન થાય, મનુષ્યને સત્યાસત્યનું જ્ઞાન થાય, નિત્યાનિત્ય વસ્તુનો વિવેક થાય તે રહસ્યવિદ્યાને ઉપનિષદ કહેવાય. આ રીતે 'વેદ' શબ્દ જ્ઞાનનો વાચક બને. સ્થૂલાર્થમાં તો એ ઋગ્વેદાદિ ગ્રંથોનો વાચક છે જ. આમ મુખ્યાર્થ જ્ઞાન અને બૌદ્ધ્યાર્થ ગ્રંથો.^{૧૦}

વેદ તરફ અત્યંત શ્રદ્ધાપૂર્ણ નેત્રાથી અનુશીલન કરનારાઓ 'વેદ' શબ્દમાં કાંઈક વિશેષ અર્થ શોધવાનો પ્રયત્ન કરે છે. તે માને છે: "✓વિદ્-જ્ઞાને ધાતુ પરથી જન્ પ્રત્યય થઈને વેદ શબ્દ બને છે. આ જન્ પ્રત્યયનો અર્થ ભાવ, કર્મ અથવા કરણ થઈ શકે છે. એટલા માટે જ્ઞાન, જ્ઞાનનો વિષય એટલે સ્વેય પદાર્થ અને જ્ઞાનનાં સાધન — આ ત્રણે 'વેદ' શબ્દના વાચ્ય બને છે."

"ધાતુપાઠમાં પાણિનિ ✓વિદ્ના સત્તા, લાભ અને વિચારવું એવા અર્થો આપે છે. 'વિચારવું' એ અર્થ જ્ઞાનમાં અંતર્ભૂત થાય. આટી રહ્યા બે અર્થ — લાભ અને સત્તા. લાભ આનંદનો ઉત્પાદક છે અથવા તો કહેા આનંદનું જ એક સ્વરૂપ છે. આમ સત્તા, આનંદ અને જ્ઞાન એ જે ત્રણ બ્રહ્મનાં જ લક્ષણો છે તે 'વેદ'નાં લક્ષણ બની જાય છે. અથવા એમ પણ કહેવાય કે ✓વિદ્ના અર્થમાં સત્તાથી ઉત્પત્તિ, જ્ઞાનથી પાલન અને લાભથી પ્રાપ્તિ

૯. સદેર્શાતોવિશરણગત્યવસાદનાથૈસ્યોપનિપૂર્વસ્ય ક્ષિપ્રપ્રત્યયાન્તસ્ય રૂપમુપનિષદિતિ... તેષામ-
વિચારાદે: સંસારબીજસ્ય વિશરણાદ્વિસનાદ્વિનાશનાદિત્યનેનાર્થયોગેન વિશોપનિષદિત્યુચ્યતે ।
...પરં બ્રહ્મ ગમયતીતિ બ્રહ્મગમયિતૃત્વેન યોગાદુક્ષવિષોપનિષત્ । ...લોકાન્તરે પૌન:પુન્યેન
પ્રવૃત્તત્સવાસાદયિતૃત્વેન શૈલિત્વાપાદનેન ધાત્વર્થયોગાદમિવિચારાદ્યુપનિષદિત્યુચ્યતે ।

—ક્રોડાપનિષદ-શાં. ભા., —આનંદ આશ્રમ પ્રથાવલિ, પૃ. ૨

૧૦. સરખાવો : ઉપનિષદ માટેના શંકરાચાર્યના વિચાર—સત્તાદિધર્મો મુલ્યવના કૃત્વોપ-
નિષદાદ્યો વર્તેતે યન્મે તુ નક્ષયેતિ ।

—ક્રોડાપનિષદ-શ્રીકૃષ્ણાખ્ય, આ. આ. મં. ૫. ૪

કહેતા હતાની ખબર મળતી નથી. આમ વેદના શબ્દાર્થમાં જ બહાનાં લક્ષણ આવી ગયું છે. પ્રાચીન કારણમાં બ્રહ્મ, વિદ્યા અને વેદ એકબીજાના પ્રમાણ તરીકે વપરાતા હતાં. પ્રયં બ્રહ્મ, કૃષી વિદ્યા, કૃષી વેદના આવા પ્રયોગો સર્વત્ર મળી આવે છે.^{૧૧} આમ વેદનો બ્રહ્મ એવો પણ અર્થ થતાઓ છે તે સમજાવવાનું બને છે. આમ વિદ્યાનો નિકષપ્રધાન પર સો દ્યુનો સામિત થઈ શકે કે કેમ એ એક પ્રશ્ન છે.

‘વેદ’ શબ્દના અન્ય અર્થો અત્રે નોંધવા અસ્થાને નહિ લેવાય. તેનો એક અર્થ ‘વિષ્ણુ’ થાય છે.^{૧૨} નાનાર્થશત્કમાં તેનો અર્થ વેદાજ્ઞ આપે છે અને વિષ્ણુનું એક નામ વેદાંજ મળ્યું છે.^{૧૩} શબ્દકોશ પ્રતિકાસની દૃષ્ટિએ એક એવો તો આની શક્ય કે બ્યારે કર્મકાંડનું જોર વધ્યું હારે મરને મહત્ત્વ મળ્યું. પરિણામે વેદના મંત્રોનો વિનિયોગ કે વ્યાખ્યા મહત્ત્વ યવા લાગી. ત્યાં સુધી સ્વીકારાયું હતું કે જે ક્રિયાપરક નહિ તે અર્થહીન.^{૧૪} બીજા બાજુએ કાળક્રમે વિષ્ણુનું મહત્ત્વ વધી ગયું. યદ એ જ વિષ્ણુ અને અગ્નિ એ દેવતાઓમાં હીન છે, વિષ્ણુ શ્રેષ્ઠ છે એવી વિચારધારાઓ અસ્તિત્વમાં આવી.^{૧૫} આ રીતે યદ એટલે વેદ અને યદ એટલે વિષ્ણુ. આ બે સમીકરણોમાંથી જાણ્યું કે નવું સમીકરણ બન્યું કે વેદ એટલે વિષ્ણુ. વિષ્ણુના સર્વક્ષેત્રે પ્રભુત્વને સ્થાપિત કરવામાં વેષ્ણુવ સંપ્રદાયનો ફાળો નાનોસાનો નહિ હોય.

વેદનો એક અર્થ વેદાંજ થાય છે. આ કેવી રીતે બન્યું હશે? ઉપર ઉદ્ધૃત વિષ્ણુ-સહસ્તના ‘લોકમાં વિષ્ણુનું એક નામ વેદાંજ મળ્યું હતું છે. ‘વેદો જેના અમશૂર છે તે ભગવાન વેદાંજ’ એવો અર્થ થતાવે છે.^{૧૬} આ વેદાંજ એ વિષ્ણુનું એક નામ છે અને વિષ્ણુ એવો એક અર્થ વેદ શબ્દનો થાય છે એ તો ઉપરની કટિકામાં દર્શાવ્યું છે. આથી વેદ શબ્દનો વેદાંજ એવો અર્થ પ્રચલિત થવામાં આ વિચારે મદદ કરી હશે.

મેદિની કાશમાં વેદનો અર્થ ‘વૃત્તમ્’ આપ્યો છે. વેદિક સાહિત્યમાં સંહિતા, બ્રાહ્મણ, આરણ્યક અને ઉપનિષદ સાહિત્યનો સમાવેશ થાય છે. તેમાં સંહિતાઓ મુખ્યત્વે હંદમાં રચાયેલી છે. તેને બ્રાહ્મણ વગેરે ગ્રંથોથી જુદી તારવવા માટે ‘હંદાસિ’ એમ કહેવાની પ્રથા કાળક્રમે અસ્તિત્વમાં આવી હતી. હંદનો પર્વાય વૃત્ત એટલે મેદિનીએ નોંધ્યું કે વેદનો એક અર્થ ‘વૃત્તમ્’ થાય છે. શબ્દરત્નાવલીમાં હંદ, નિગમ અને બ્રહ્મ એવા ‘વેદ’ શબ્દના અર્થો

૧૧. જુઓ : મહામહોપાધ્યાય ગિરિધર શર્મા ચતુર્વેદી, વેદિક વિજ્ઞાન, પ્રથમ આવૃત્તિ, પૃ. ૨૭.

૧૨. વેદો વેદવિદ્યજ્ઞો વેદાજ્ઞો વેદવિદ્ કવિઃ ।

—વિષ્ણુસહસ્તનામ, ‘લોક’ ૨૭. આના પર બાબ કરતાં શકરાચાર્ય લખે છે—વેદરૂપવાદ્ વેદઃ વેદયતીતિ વા વેદઃ ‘તેવામેવાનુકમ્પાર્થમદમજ્ઞાનજં તમઃ । નાકાચાર્યનામ્પ્રમાવસ્યો જ્ઞાનકીપેન માસ્વતા ॥ (ગીતા ૧૦-૧૧) इति भगवद्भवनात् ।

—ગીતાપ્રેસ, ગોરખપુરની ૭મી આવૃત્તિ, પૃ. ૧૦૫.

૧૩. બ્રાહ્મણસ્ય ક્રિયાર્થસ્વાદાનયંક્યમતદર્શનાં તસ્માદ્વિત્યમુચ્યતે । જી. સુ. ૧-૨-૧

૧૪. ચક્ષો વૈ વિષ્ણુઃ । વળી અગ્નિર્વૈ દેવાનામવમો વિષ્ણુઃ પરબ્રહ્મ ।

૧૫. વેદા બ્રહ્મભૂતા યસ્ય સઃ વેદાજ્ઞઃ —વિષ્ણુસહસ્ત ‘લોક’ ૨૭ પરતું શકરાચાર્યનું બાબ, ગીતાપ્રેસ, ગોરખપુરની ૭મી આવૃત્તિ, પૃ. ૧૦૬.

આપ્યા છે. અહીં પ્રતિપાદ-પ્રતિપાદકના અમેદને કારણે વેદ એટલે બ્રહ્મ એવો અર્થ પ્રચલિત થયેલો જણાય છે, કારણ વેદના ધર્મ-ચરૂપ બનેલ ઉપનિષદ સાદિત્વનો પ્રતિપાદ વિષય બ્રહ્મ છે. વળી સત્ય જ્ઞાનમનન્તે બ્રહ્મ મુજબ જ્ઞાન એ બ્રહ્મનું લક્ષણ છે અને વેદ એટલે જ્ઞાન એ અર્થ સર્વમાન્ય છે. આથી વેદ એટલે બ્રહ્મ એવું અર્થઘટન થયું હોય તેવી સંક્રમતા નકારી શકાય તેમ નથી. અમરકોશમાં 'વેદ'ના શ્રુતિ અને આત્માય એવા બે પ્રયોગો આપ્યા છે. આત્માય એટલે પરંપરા. વેદો ગુરુશિષ્યની પરંપરા દ્વારા ક્રિતરી આવેલા છે. આનું જ્ઞાન કાનોકાન એકબીજાને થતું. તેથી તેનું શ્રુતિ એવું નામ પ્રચલિત થયું. આ શબ્દ-બ્રહ્મનું સ્ફુરણ પ્રથમ હૃદયકાકાશમાં ઋષિઓને થયું અને પછી તે શ્રુતિમય બન્યા માટે પણ તે શ્રુતિ કહેવાયા.

વેદની સંખ્યા ચાર છે. આથી લક્ષણાથી 'વેદ' શબ્દ 'ચાર' એવા અર્થનો પણ વાચક બને છે. વેદવ્યતીતિ વેદો વિધિ: એટલે કર્મકાંડ એવો પણ એક અર્થ 'વેદ' શબ્દનો થાય છે. આ અર્થમાં તે મહાભારતમાં પ્રયોજાયો છે. 'વેદ' શબ્દનો સ્મૃતિ એવો અર્થ પણ મહાભારતમાં માની લેવાયો છે એમ એક ઉદ્દેશ્ય પરથી જણાય છે.^{૧૧} આ ઉપરાંત 'વેદ'નો એક અર્થ 'કુશ-દંભ'નો સમૂહ' એવો ઘટાળ્યો છે.^{૧૭} આ અર્થ માટેની કહી મળતી નથી.

વેદનું ટીકાકારો અને સંપ્રદાયો કેવું અર્થઘટન કરે છે તે નોંધવું રસપ્રદ ધર્મપડશે. અમરકોશની ટીકા કરનાર ક્ષીરસ્વામી 'વિદત્યનેન ધર્મ વેદ:' એવો અર્થ કરે છે. હેમચન્દ્રાચાર્ય 'વિદત્યનેન ધર્મ વેદ:' એવી વ્યુત્પત્તિ સ્વીકારે છે. મીમાંસકો મુજબ અપૌરુષેય વાક્ય એટલે વેદ.^{૧૮} ધર્મ-બ્રહ્મનું પ્રતિપાદન કરનાર અપૌરુષેય વાક્ય એટલે વેદ એવી વેદાન્તીઓની માન્યતા છે.^{૧૯} બ્રહ્માના મુખમાંથી નીકળેલ ધર્મનો ભોધ કરાવનાર શાસ્ત્ર તે વેદ એવું પુરાણો પ્રતિપાદન કરે છે.^{૨૦} યોગશાસ્ત્ર મત્યાવતારમાં ભગવાને કહેલ વાક્ય તે વેદ એમ માને છે.^{૨૧} મત્યપુરાણ મુજબ પ્રલય દરમિયાન ભગવાને મત્યનું રૂપ લઈને વેદનું રક્ષણ કર્યું હતું. ગીતગોવિંદમાં પણ આ અર્થને અનુલક્ષીને મત્યાવતાર માટે 'વેદોનો ઉદ્ધાર કરે છે' એવા શબ્દો વાપરવામાં આવ્યા છે.

૧૬. વેદવાદસ્ય વિજ્ઞાનં સત્યાસત્યમિવાનુતમ્ । મહા. ૧૨-૧૦-૨૦.

વળી,

આત્માયેભ્યઃ પુનર્વેદાઃ પ્રસૂતા સર્વતોમુખાઃ । મહા. ૧૨-૨૬૦-૬.

૧૭. A bundle of Kus'a grass : પદ્માક્ષમાલામુત અનુમાર્જનં વેદં ચ સાક્ષાત્તપ એવ રુપિણી । ભાગ ૧૨-૮-૩૪. જુઓ : Apte's Sanskrit-English Dictionary, P. III, p. 1496.

૧૮. અપૌરુષેયં વાક્યં વેદઃ ।

૧૯. ધર્મબ્રહ્મપ્રતિપાદકં અગૌરુવેદવાક્યં વેદઃ । —શબ્દકોશપદ્યુમ, ભા. ૪, પૃ. ૪૬૬.

૨૦. બ્રહ્મમુલ્લવિર્નિર્ગતધર્મજ્ઞાપકશાસ્ત્રં વેદઃ । —શબ્દકોશપદ્યુમ, ભાગ ૪, પૃ. ૪૬૬.

૨૧. મીનશરીરાવચ્છેદેન મગવદ્વાક્યં વેદઃ । —શબ્દકોશપદ્યુમ, ભા. ૪, પૃ. ૪૬૬.

વેદાનુદ્ધરતે —ગીતગોવિંદ.

આ સમગ્ર મર્ચ પછી કહે છે કે 'વેદ'ની સર્વવ્યાપ્તિ અને અતિવ્યાપ્તિ, અવ્યાપ્તિ કે અસંભવના દોષથી રહિત વ્યાખ્યા આપવી મુશ્કેલ નહિ તો અધરી અવરજ છે. સામ્યકાર્યો અદ્વિતીયકાર્યોમાં ફિત્તુત પૂર્વપક્ષ કરી સિદ્ધ કર્યું છે કે 'મન્ત્રબ્રાહ્મણત્મકો હિ વેદઃ' અને પોતાના મતના સમર્થન માટે યજુર્પરિણામમાંથી આપસ્તંબનું એક અવતરણ આપ્યું છે. ૨૨ આમ મંત્ર અને બ્રાહ્મણના સમૂહને વેદ કહેવાય. જેનો યજુર્મા વિનિયમ થાય અથવા જેને અભિયુક્તો (અભિયો) એમ કહે કે આ મંત્ર તે મંત્ર કહેવાય. ૨૩ આમનું શ્રુતિસાહિત્ય બ્રાહ્મણ કહેવાય. આમાં હેતુ, નિર્વચન, નિર્દેશ, પ્રશંસા, સંશય, વિધિ, પરિક્રિયા, પુરાકલ્પ, વ્યવધારણકલ્પના અને ઉપમાનો સમાવેશ થાય છે. ૨૪ વેદની આ વ્યાખ્યાને ધારે સંદિગ્ધ મણે છે. ૨૫ પણ પરંપરાએ વેદિક સાહિત્યને સ્મૃતિ વગેરે અન્ય ધાર્મિક સાહિત્યથી અલગ તારવવા માટે વેદની આ વ્યાખ્યા સ્વીકારી છે. જ્યાં સુધી પરંપરાના અભિયોને તોડી પાડવા માટે પૂરતા પુરાવાઓ ન મળે ત્યાં સુધી તેનો સ્વીકાર કરવામાં વાંધો શું ?

મંત્રો ચાર સંહિતાઓમાં સંગૃહીત થયેલા છે : (૧) ઋગ્વેદ, (૨) સામવેદ, (૩) યજુર્વેદ, (૪) અથર્વવેદ. મૂળમાં વેદ એક હતો, અને વેદવ્યાસે તેને પૃથક્ કરીને ૨૧ ચાર સંહિતાઓમાં વ્યવસ્થિત કર્યાં. અને પોતાના પૈલ, વૈશંપાયન, જૈમિનિ અને સુમન્તુ નામના શિષ્યોને ઋગ્વેદ, સામવેદ, યજુર્વેદ અને અથર્વવેદનો ઉપદેશ કર્યો. કૃષ્ણપુરાણ, વિષ્ણુપુરાણ, ભાગવત વગેરે સ્થળોએ પણ વેદવ્યાસને વેદોની પૃથક્ પૃથક્ વ્યવસ્થા-ગોઠવણી કરનાર તરીકે વિસ્તારથી વર્ણવ્યા છે. ૨૭

૨૨. મન્ત્રબ્રાહ્મણયોર્વેદનામધેયમ્ । આ. પરિ. ૧-૩૩. જુઓ : પ્રો. એચ. ડી. વેલ્કર સંપાદિત ઋક્સુક્તવૈજયન્તી ના ચારંભામાં સાયણ્યાચાર્યની ઋક્ભાષ્યમૂલિકા, પૃ. ૪૮.

૨૩. તથોદકેષુ મન્ત્રાભ્યાઃ । જૈ. સુ. ૨-૧-૩૨ વળી. અભિયુક્તાં 'મન્ત્રોડયમ્' इति समाख्यानं लक्षणम् — सायण्य जै. न्या. जुओ भीमांसादर्शन, पं. भयाशंकर शर्मा, पृ. ८३

૨૪. શેષે બ્રાહ્મણશબ્દઃ । જૈ. સુ. ૨-૧-૩૩
हेतुनिवचनं निन्दा प्रशंसा संशयो विधिः ।

પરિક્રિયાપુરાકલ્પો વ્યવધારણકલ્પના ॥

उपमानं दशैते तु विषयो ब्राह्मणस्य तु । જુઓ : भीमांसादर्शन, भयाशंकर शर्मा, पृ. ८४

૨૫. "You see how very vague is the connotation of terms વેદ, મન્ત્ર and બ્રાહ્મણ; and their denotation is to be ascertained only from tradition".

—Ghate's Lectures on Rigveda, Fourth Edition, p. 22

૨૬. વેદાન્ વ્યસ્ત્યતિ વિમિન્નશાસ્ત્રાત્વેન પૃથક્ કરોતિ इति वेदव्यासः आवी तेभान् नामनी व्याख्या છે.

૨૭. તત્રાદૌ બ્રહ્મરમ્પરયા પ્રાપ્તં વેદં વેદવ્યાસો મન્દમતીન્ મનુષ્યાન્ વિચિન્ત્ય તત્કલ્પયા તતુર્ષાં વ્યસ્ય ઋગ્યજુઃસામાચર્યાંશ્ચતુરો વેદાન્ પૈલવૈશંપાયનજૈમિનિસુમન્તુભ્યઃ કમાદુપવિદેશ ।

—મહાધર યજુર્વેદભાષ્યના ચારંભામાં. જુઓ : વૈ. જા. ઈ. મગવહત્, પૃ. ૧૪૫ વળી,

पूर्व भगवता व्यासेन ऋगदुपकारार्थमेकीभूय स्थिताः वेदाः व्यस्ताः शाकाश्च परिच्छिन्नाः ।

તે. સં. ના ભાષ્યકાર ભટ્ટભારતકર. જુઓ : Ghate's Lectures on Rigveda, p. 29.

આ ઉપરની વિસ્તૃત અર્થાં પરથી એમ દર્શિત થતું આવે છે કે વેદવ્યાસે પોતાના સમયમાં ઉપલબ્ધ વેદના મંત્રોની જુદી જુદી શાખાઓને એકત્ર કરી, અસંવિધિત અદિતાની રચના કરી હતી. આ રચનાઓ જ્ઞાનનું સાધન હોવાથી તેને વેદ એટલે જાણ એવું સાર્થક નામ આપાયું. આ જ્ઞાન એટલે વેદની ભવસ્થાના કાર્યમાં બ્રાહ્મ પ્રધાન સંપાદક (General Editor) રહ્યા હશે અને સંપાદન અથવા સંકલ્પીકરણ (Codification)ના કાર્યમાં પૈશ, વેશંપાયન વગેરે શિષ્યો સહ-સંપાદકની ભાદક તે તે અદિતાના સંકલ્પીકરણમાં મદદમાર રહ્યા હશે તેથી તે તે વેદ સાથે તેઓનાં નામ જોડી દેવામાં હશે. અસંખ્યત આ કલ્પના છે, પણ તેને માનવાને કારણ છે. જૈ. સુ.ના કર્તા જૈમિનિ જણાવે છે કે જ્યાં અર્થને કારણે પદ્યભવસ્થા ધર્મ તે અદ્, ૨૮ જે મંત્રોનું જ્ઞાન થતું તે સામ કહેવાય. ૨૯ જ્યારે આકીના યજુસ્ તરીકે ઓળખાયા. ૩૦ આ સૂચવે છે કે વેદવ્યાસે વિષમને અનુરૂપ ભવસ્થા કરીને અગ્નિવેદ, સામવેદ, વગેરે વેદોને અત્યારે પ્રાપ્ત થાય છે તેવું કામગીરી સ્વરૂપ આપ્યું અને તેનું 'વેદ' એટલે જ્ઞાન એવું સાર્થક નામકરણ કર્યું હતું.

Summary

Vedas the most precious Will of Indian culture—the earliest literary monuments of India—perhaps the world.

What is *Veda*? The word *Veda* is used in *Sanhitās* and other works of Vedic literature—*Veda* means *Sacred Lore*—તૈ. સં. and તૈ. આ. derive it from √વિદ્=To obtain (6. U.)—according to મદ્ભાસ્કર it is derived from √વિદ્=To know (2. P.).

√વિદ્ and Latin *Videre*=To see are the same—In આયુર્વેદ and યાજુષશાસ્ત્ર √વિદ્=To exit (4. A.) and √વિદ્=To obtain are regarded as the root of this word—Commentator બલહુન tries to derive it from √વિદ્ belonging to 2nd, 4th, 6th and 7th conjugation.

અભિનવગુપ્ત derived it from a root √વિદ્ meaning To exist (4. A.) To obtain (6. U.) and To understand (7. U.). દયાનન્દ સરસ્વતી tried to derive it from √વિદ્ belonging to all the four conjugations—such derivations are not unknown to Indian mind—શંકરાચાર્ય derived a word ઉપનિષદ્ from all the three possible meanings of √સદ્.

૨૮. ક્રમ્ વપ્રાર્યવક્ત્રેન પાદ્યવસ્થા । જૈ. સુ. ૨-૧-૩૫ પાદેન અર્થેન ચ હવેતા વૃત્તવદા

મન્ત્રાઃ ક્રચઃ । જુઓ : મીમાંસાદર્શન, મધ્યશિક્ષક શર્મા, પૃ. ૮૫

૨૯. ગીતિષુ સામઃ । જૈ. સુ. ૨-૧-૩૬

૩૦. શોષે ચક્ષુઃ શબ્દઃ । જૈ. સુ. ૨-૧-૩૭

कर्म tried to prove वेद=ब्रह्म with the help of three meanings of $\sqrt{\text{वेद}}$ viz. To exist (सत्), To know (knowledge विद्) and To obtain (i.e. To gain and gain always gives pleasure, so it means here आनन्द) — This is poetic but unconvincing.

Other meaning of वेद is विष्णु — History can be easily traced — Sacrifice secured prominent position in later Vedic literature — विष्णु was identified with sacrifice — so वेद means विष्णु — *Mimāṃsā* — and *Vaiṣṇavism* played important role.

वेद means वेदाङ्ग — विष्णुसहस्रनाम says विष्णु means वेदाङ्ग — वेद means विष्णु — so वेद means वेदाङ्ग — Another meaning is वृत्तम् (a metre) — *Sanhitā* portion of the Vedic literature was called छंदोवि to distinguish it from *Brāhmanās* and *Upanishadas* which are mainly composed in prose — Later on वेद denoted meaning वृत्तम् (a metre) — One meaning is ब्रह्मन् — dew to the description of ब्रह्मन् in later Vedic literature — *Veda* means four — as they are four in number — It means *A bundle of Kusha grass* — this meaning is untraceable.

Vedās defined by *Mimāṃsā*, *Vedānta*, *Purāṇas* and *Yoga* — सायण and आपस्तम्ब regarded it as the Collection of मन्त्र and ब्राह्मण — Ghate regarded this definition as very vague — Unless there is solid and sound proof one need not contradict the well-established tradition.

According to tradition व्यास divided one वेद into four — It seems he made *Codification* — He remained *General Editor* while his disciples पैल, वैशम्पायन, जैमिनि and सुमन्तु were *Assistant Editors* for this *Codification*.

COMMUNIST, CAPITALIST, AND MIXED ECONOMICS VERSUS SCIENTIFIC ECONOMICS

DR. RALPH BORSODI

For the last fifteen years I have been insisting that economics is not a science: that it ought to be a science, but that as a matter of fact, it is a pseudo-science and ought not to be called a science at all.

Nothing, I believe, proves this more conclusively than the fact that I am here discussing the difference between Capitalist, Communist, and Mixed Economics. Nothing, I believe, proves this more conclusively than the fact that there should be three great schools of economic thought, each of which maintains that it alone is a science, and that the others are nothing but ideological aberrations.

Real sciences have no such problems with which to deal. There is no such thing as Red physics, White physics and Mixed physics. There is no such thing as Red mathematics, White mathematics and Mixed mathematics. There is no such thing as Red biology, White biology and Mixed biology. There is only physics. There is only mathematics. There is only biology. You do not have national boundaries on one side of which there is Red biology, and on the other White biology. Nor other boundaries inside of which there is Mixed biology and on one side of which there is White and on the other Red biology.

The boundary between Russia and the United States is not only the boundary between two nations; it is also the boundary between two economic sciences, one called Capitalist and the other Communist. In China by the accident of history, economic science became Communist; in India by a similar

accident of history, economic science became neither Capitalist nor Communist, but a mixture of the two.

There is, I maintain, only one way of dealing with this situation, and that is to recognize that we are not as yet dealing with a science at all, that we are still dealing with an art which has not yet been transformed into a science. Real sciences come into existence only when the facts with which they deal and the natural laws they discover have universality and perpetuality. The facts with which a scientific economics must deal are as old as mankind. They existed before money was invented, when all trade was a matter of barter. The natural laws of economics applied in the past; they will apply in the future; they apply today no matter what the social and political system of a nation.

Everybody would think it absurd if someone seriously maintained that the Einstein's principles of relativity applied only in the United States; that relativity stops at its boundaries, and that here in India no such natural laws exist. So with economics. If what is called the theory of marginal utility is true in Austria, and if it is truly a scientific natural law, then it is true everywhere. It can be disregarded, but it cannot be violated. You can jump off the top of the Eiffel Tower in Paris; you can fly over the Eiffel Tower in an airplane, but in neither instance do you violate the laws of gravitation.

Capitalist economics is a deductive not an inductive science, if it is a science at all. Adam Smith and his followers began with what they thought was an axiomatic truth. *If all are permitted, to follow their most selfish desires in their economic activities, in some mysterious fashion, the ultimate result will be of benefit to everybody.* All laws in any manner restricting people's activities economically, they maintained, should be abolished. The whole system of economics which they developed was a fascinating deduction from this axiom. The trouble with this axiom is not that it is untrue. If it were completely untrue, it would long ago have been repudiated. The fact that it is only half true makes it incredibly difficult to make its untruth clear to those who accept it.

Communist economics began with an entirely different axiom. In fact it began not with one, but with two axioms. In the Communist Manifesto they are treated not as mere economic theories, but as if they were revelations from God. The first is this: *All the means of production and distribution should be socially owned.* The second is this: *Work should be required from each person according to ability, goods should be distributed to each person according to need.* The whole of Communist economics is a fantastic so-called science which aims some day, some time in the future, to make realities out of these arbitrary and dogmatic axioms which have nothing at all to do with the realities of human nature and the realities of justice and efficiency.

Mixed economics is, if possible, even less scientific than Capitalist and Communist economics. It begins by accepting both the axioms of Capitalism and Communism. But then it adds a fourth axiom to the other three. It is not satisfied with trying to make oil and water mix; it is not satisfied with accepting two utterly opposed principles and trying to make them operate side by side, it adds a third principle of its own. This axiom I think of as follows: *All the economic activities of the nation should be planned by the state.* Capitalist economists made selfishness into a God. Communist economists made Altruism into a God. Mixed economists are making the State into a God. The state, they maintain, should determine what is produced; the state should determine how it is produced; the state should determine how it is distributed.

Different as are these three different kinds of so-called sciences, they have all one thing in common: All of them start with the same conception of the nature of man. All of them assume that there is such a thing as an *economic man*. All of them assume that human nature is economically determined; all of them assume that the history of mankind is materially or economically determined. And all of them are alike in ignoring the fact that there is no such thing as economic man. Man is an infinitely more complex creature than the economists

are willing to recognize. And the history of mankind cannot be explained solely and simply in economic terms.

Before submitting to you the suggestions I have for the development of a truly economic science, let me try to make clear what it seems to me all sciences should be. Nothing, in my opinion, should be called a science which does not deal with facts and which does not seek principles which are universally and perpetually true. Science cannot be parochial and national. The moment we are confronted with so-called sciences of this kind, our suspicions should be aroused, and what they assert and what they prescribed should be considered with the utmost scepticism.

But much greater should be our scepticism and our suspicion when a science begins normatively instead of descriptively, when a so-called science first prescribes what should be done, and then after having arrived at its conclusions begin to present to us a description of the facts which it claims justify its prescription. Every true science should begin in the exact opposite way. It should begin as a descriptive science; it should base its theories and its axioms upon facts which are objectively established; it should take all the facts and not only a few selected facts into account.

Normative science, it is true, should be the goal. Every science should ultimately aim at answering the question of how to deal with the problems that man and society face. But what it then prescribes must not reflect any arbitrary and dogmatic pre-conceptions; it must reflect what indisputable facts establish as true.

Since I attach so much importance to inductive and descriptive rather than to deductive science in constructing the foundations of science, it becomes necessary to be crystal clear about what it is that a science is to describe, what facts which it is to observe and what the inductions upon which it is to base its generalisations. It is at this point that economics as we know it today is most vague. It is at this point that it deceives

itself. And it is with regard to this that I am going to discuss the subject in my lecture tomorrow.

Economics, unlike the physical and biological sciences, deals not with one body of facts, but with six. Physics is satisfied to deal with the facts revealed by physical materials and physical forces. Biology is satisfied with confining itself to facts revealed by the observation of living organisms; Psychology, with the facts revealed by the study of man's mind and his mental activities. But economists are more ambitious. They are not satisfied with one body of facts, but have boldly taken on six. And as I see our situation, it is this which is unrecognized, and it is this which makes the study of economics so confusing, and which makes it easy for the most absurd and unrealistic doctrines to be taught as economic science.

What are these six sets of facts? Let me try briefly to describe them and so lay a foundation for our discussion of them tomorrow.

I. The first are the facts about our *economic values*. We all have economic values. It is these values which determine what we want and how much we want. It is these values which determine what we are willing to pay for them, and what is the kind of work we pursue in trying to obtain. There is an immense literature with regard to economic values; value theory looms large in the discussions of economists. But as I shall try to show you, the facts with regard to them have not only been assembled, they are for the most part unrecognized.

II. The second facts are those which have to do with *possessions*. Mankind must obviously obtain possessions, must use and consume possessions, must produce and distribute possessions. But the facts about possessions are assumed in economics today, they are not matters of scientific observation, and what is worst of all, the different kinds of possessions are not taken into account, and mistaken inferences about them adopted and discussed as if they were scientific truths.

III. The third facts calling for scientific observation are *enterprises*. Enterprises we must have; we have always had them; we always will. But again what economics has to say about enterprises is based only upon a partial and imperfect study of certain restricted types of enterprises. Genuine sciences must take all and not only a part of its facts into account. The biologist cannot create a science by restricting himself only to study of cytology. Cell life is important, but it is only a part of life, and it is life as a whole with which biologic science is concerned.

IV. The fourth body of facts with which economics must deal and which call for the most meticulous study are costs. I shall try to make clear what I mean by costs tomorrow. There simply is no time today to make clear why I attach so much importance to costs, and why I insist that the failure to adequately study them vitiates so much of what is accepted as economic truth today. And for an Indian audience, it is ironic that about this matter, Gandhiji was a sounder economist than most of the economists who shape Indian national economic policy today.

V. Fifth are what I call *transactions*. Transactions are facts which have universality and perpetuity. Transactions take place no matter what the economic system adopted by a nation. Transactions were facts among the primitive tribes of mankind; they are facts today, and they will remain facts even if we never arrive at the golden utopia of communism and permit mankind to work as it desires and according to ability, and pay for work not in accordance with what is done, but in accordance with what mankind needs or desires.

VI. Finally, there are the facts about *violence*. Strange as it may seem to you at first, violence plays not a minor, but an enormous part in shaping economic life today, not only in Communist, but also in Capitalist and in Mixed economic societies. But again the facts about the part which violent acts

play in economics are not fully taken into account, and as a result violence is frequently recommended and used without the fact being recognized either by those who practice it or by those who are victimized by it.

It is the problems which the existence of these six kinds of facts create which will be the subject of my discussion tomorrow.

It is with these problems, which are actual and real problems, both for individual men and women and for society as a whole, with which a true scientific economics must deal.

CONSUMER PRICE INDEX NUMBER FOR AHMEDABAD

JITENDRA L. DHOLAKIA

It is proposed to discuss two important questions relating to the consumer price index number for Ahmedabad. The first question is : whether the compilation of the consumer price index number in the new series is scientific and proper? It is necessary to discuss this question as there has been some criticism that the compilation of the consumer price index number for Ahmedabad is unscientific. The second question is : what will be the effect of the adoption of new series of index number on the dearness allowance payable to workers in Ahmedabad? It is also essential to examine this aspect of the consumer price index number as the actual dearness allowance worked out on the basis of the consumer price index number would measure the pecuniary benefit to the working class in Ahmedabad.

The old series of the consumer price index number for Ahmedabad was based on the weighting diagram constructed from working class family budget enquiry conducted during February-August, 1926, with average price for August 1926 to July 1927 equated to 100 as base year. This series reflected the consumption pattern of the working class as it existed in 1926. Food, fuel and lighting, clothing, house rent and miscellaneous were assigned 58, 7, 10, 12 and 4 weights respectively which aggregated to 91. These weights were based on the percentage of expenditure on them arrived at from the family budget enquiry in 1926. In 1926-27, population of Ahmedabad was 2,90,000 and 985 budgets were collected. The new series for the working class consumer price index is based on the enquiry into 722 working class families conducted by the Labour Bureau, Simla, during September 1958 to August 1959. The

weighting diagram for the new series is based on 110 articles divided into the main groups of food, fuel and lighting, housing, clothing and miscellaneous, which carry respectively weights of 64.41, 6.22, 5.05, 9.08 and 15.24. The year 1960 constitutes the base year so far as average prices are concerned. The new series is composed of the weights relating to the enquiry during the year 1958-59 and the price data relating to the calendar year 1960. The methodology of price collection remains more or less unchanged except for the increase in the number of shops from which prices are collected and localities to which these shops relate.

The main criticism of the new series of the consumer price index number has been that the size of the sample has been thoroughly inadequate and, therefore, the results of this enquiry could not be considered as representative for deriving a weighting diagram.¹ It has been contended by the critics that the size of the sample for Family Budget Enquiry in 1958-59 in Ahmedabad works out at less than half per cent because of 722 families were selected for the purpose of enquiry out of a total population of 11,00,000 in Ahmedabad City in 1958-59. It is further maintained by the critics that the sample sizes selected in respect of earlier enquiries were far higher than three per cent of the statistical universe. It is, therefore, said that data on which the new series is based are incomprehensive and the method of compiling index number unscientific and improper.

It is in the first instance not true that the size of the sample works out to less than .5 per cent. The sample size consists of 722 families and the estimated number of working class families as defined for the purpose of the survey was 51.5 thousands in 1958-59. The percentage would come to 1.4 and not less than .5. Even then it might be contended that the size of the sample is too small to vitiate the findings of the enquiry.

¹ See, Gujarat Labour Gazette, Vol. V, No. 3, March 1955, for arguments advanced by a person appearing on behalf of the Mill-owners' Association, pages 386-389.

Many people who are unfamiliar with sampling probably overrate the importance of sample size as such, taking the view that as long as the sample is big enough, all will be well. This view is erroneous because the small percentage coverage is in itself not a handicap when the total universe from which the sampling is done is large. In this connection, it is necessary to quote the view of the expert, who says, "If the population is large, the finite correction $N-n/N-1$ practically vanishes and the precision of the sample result is seen to depend on n , the size of the sample, not on n/N , the proportion of the population included in the sample".² Thus, in the case of the new series for Ahmedabad, the precision of the sample result is dependent on the size of the sample and not on the proportion of the working class population included in the sample. In the case of Ahmedabad, the total universe was large and smaller sample in terms of small percentage coverage could not be regarded as vitiating the findings of the family budget enquiry in 1958-59.

The size of the sample is determined in the light of the permissible margin of error in the resulting series of the consumer price index number. In India, permissible margin works out at 2 per cent. Studies by Labour Bureau, Simla, have shown that to conform to this permissible limit of error in the index, the minimum sample size at a small urban centre required for deriving the weighting pattern for the family living survey is roughly 250 consuming units for manual industrial workers and 400 for non-manual employees. At bigger centre, the sample size required on the basis of the same criterion of the permissible margin of error works out roughly at 700 families. For example, in the city of Calcutta, a sample size of 720 families was taken for manual industrial workers.³ The sample size of 720 workers was regarded as quite adequate for the city of Calcutta.

² C. A. Moser, *Survey Methods in Social Investigation*, page 115.

³ See, in the connection, views of Dr. Basu in *Consumer Price Index*, Labour Bureau, Simla, pages 54-55.

When the permissible error in the index is 2 per cent, the number of families, viz. 722 taken at Ahmedabad appears to be satisfactory. 0.1 per cent of the total population was considered sufficient for the purpose of arriving at weighting diagram in the United Kingdom. Thus, it is not correct to say that the size of the sample for the construction of new series of consumer index number for Ahmedabad is too small. The family living survey in 1958-59 at Ahmedabad was carried out under the guidance of a Technical Advisory Committee and utmost care had been taken to follow the recommendations of the International Labour Organisation regarding several aspects of the family living survey.⁴ Therefore, the weighting diagram derived from the family living survey was correct and compilation of the consumer price index number was systematically and scientifically done.

When a new series based on a more recent pattern of living is constructed it is but natural to discontinue the compilation of the old series in Ahmedabad. With the revision of the series after ten or fifteen years, a long distance comparison can be made by linking the old and the new series at some common period of time, say, the base period of the new series. This was an administrative necessity because a number of collective agreements between employers and employees were based on the old series for Ahmedabad. The Government of Gujarat therefore referred the question as to how the new series of consumer price index number for Ahmedabad should be linked with the old series to the Expert Committee appointed for this purpose. The problem was of arriving at the linking factor so that when the new series is adopted and the old series is discontinued, the dearness allowance can be computed even on the basis of the new series.

The Expert Committee appointed by the Government of Gujarat considered the questions of readjustments in the old

⁴ See, Award of the Industrial Court, Gujarat, regarding dearness allowance in Ahmedabad, 1964, pages 36-37.

series and the linking ratio. The Committee came to the conclusion that certain adjustments in the old series were necessary before linking it with the new. In the old series of the consumer price index number for working class in Ahmedabad, the prices of cloth had been kept fixed since 1952-53 and the house rent index was kept constant since 1930. The Committee worked out the revised clothing group index and the house rent index and recommended a linking ratio of 3.17.⁵ This in effect meant that 19 points were added to the over-all price index in the old series and fixed it at 317 instead of 298 as it stood when the new series and its base period were decided upon.

It is interesting to find out whether the working class gained anything from the revision of the consumer price index numbers in Ahmedabad. In terms of actual average amount of dearness allowance payable per month of 26 working days the difference in the year 1961 was Rs. 2.13 per month per worker, Rs. 3.79 per month per worker in 1962 and Rs. 9 per month per worker in 1963. With the adoption of the new series the dearness allowance paid under the new converted series for 26 working days in a month was as follows:

TABLE 1

<i>Year and Months</i>	<i>Amount of dearness allowance for 26 weekly days</i>
1964	Rs.
January	107.8
February	112.8
March	113.11
April	114.13
May	115.13
June	116.17
July	120.13

⁵ Report of the Expert Committee on Consumer Price Index Revision, Government of Gujarat, pages 19-20.

It can be seen from the above table that for some months in 1964 the dearness allowance payable to workers in Ahmedabad rose as the index number went up in comparison to the base-year. There was a steep rise in the price of essential articles entering into the family budgets of the working class. But the question still remains whether the payment of dearness allowance neutralized completely the rise in the cost of living. The question is whether the real wages of workers increased or not. In this context, it is important to note that only in the case of the lowest paid employee, did the payment of dearness allowance provide a cent per cent neutralization for the rise in the general level of prices. The lowest wage was the pre-war minimum wage of Rs. 28-0-6. This was fixed by the Industrial Court for the textile worker. For workers other than in the lowest paid category, the revision of the consumer price index number has not provided for cent per cent neutralisation for the rise in the cost of living. For silk industry, the dearness allowance paid under the award of the Industrial Court is 72.5 per cent of the dearness allowance paid to textile workers. Even in the case of Anil Starch Product Ltd., the demand for an increase from 90 per cent of the Cotton textile scale to 100 per cent was rejected. A large number of concerns in engineering industry in Ahmedabad, dearness allowance neutralizes only 70 to 75 per cent increase in the cost of living. Many medium-sized and small units in Ahmedabad have not yet adopted the scale of dearness allowance payable to the textile workers in Ahmedabad. Though the construction of new series of consumer price index number has raised upwards the dearness allowance of the workers in Ahmedabad, it has not yet provided for complete neutralization for the rise in the cost of living. This is because neutralization is provided only in the case of the lowest paid employee in the textile industry. For workers other than the lowest paid category, the principle laid down by the Industrial Court is that the dearness allowance to which workers are accustomed should not be reduced unless the cost of living goes down appreciably. This is a negative principle upholding

Consumers Price Index Number for Ahmedabad

the status quo in so far as the present practice of paying dearness allowance is concerned.

The practice of linking dearness allowance to the cost of living index was originally recommended by the Bombay Industrial Court in 1949 in connection with the demand of the Cotton textile workers in Ahmedabad. Under this system which is prevalent in all the centres of textile industry in Gujarat, a certain rate of allowance is fixed for every point rise in the index number above a certain level. In a number of other industries, the rates fixed for the cotton textile mills have been adopted as a standard and the rate of dearness allowance has been fixed at a certain percentage thereof. In order to maintain differentials in the dearness allowance payable to workers employed in different industries, it may be necessary to fix a different rate of dearness allowance per point, for industries other than cotton textile. The reason for adopting this practice is that the rate of dearness allowance payable to the textile workers cannot be regarded as sacrosanct as it does not always neutralize the rise in the cost of living. Recently, all the three Central Wage Boards (for Cement, Jute and Sugar industries) have also recommended that the dearness allowance should be linked to the consumer price index number even in those units or centres where it was not earlier. The Wage Board for working journalists has also recommended similar linking of the dearness allowance to the consumer price index.

In the case of industries in Ahmedabad covered by the Minimum Wages Act, there is the practice of paying consolidated wages to workers. Enquiries into the wage structure of the leather manufacturing and the tanneries reveal that very inadequate amount is paid as a consolidated wage to workers employed in units of these industries in Ahmedabad. No separate dearness allowance is paid to these workers. The revision of the consumer price index number has not benefitted to the workers employed in the industries governed by the Minimum Wages Act. It is true that the Minimum Wages Act does not lay down any guiding principle for the fixation of dearness allowance,

46 Page
but merely authorises the appropriate authorities to prescribe a consolidated wage or to fix a basic minimum wage and a special allowance either fixed or adjustable with the variation in the cost of living index number in respect of persons employed in industries covered by the Act. But in the interest of protecting the minimum standard of living of the workers employed in sweated industries, it is essential to pay the dearness allowance to workers covered by the Minimum Wages Act.

We have examined above the questions relating to the compilation of the consumer price index number in Ahmedabad and the system of the payment of the dearness allowance. The changes in the consumer price index number measure the changes in the retail prices of a fixed basket of consumption goods and services consumed by the working class as compared to the respective prices during the fixed period known as the base period. In this connection, it may be suggested that an attempt must be made to design a fool-proof system of the price collection of items entering into the family budgets of the workers. It is generally held that the present system of price collection leaves much to be desired. Under the present set up, there is sometime over-pricing and at times under-pricing of the commodities. Since the weighting diagram and retail prices are the most essential constituents of the consumer price index number, utmost care has to be taken in the matter of the collection of prices. If the price data are accurate, the resulting index number and dearness allowance based on it would truly reflect the realities of the situation. The correct index number is a well known scientific device to maintain the standard of living of the working class.

INPUT AND OUTPUT TRENDS IN INDIAN INDUSTRIES

M. C. JAISWAL

Gujarat University, Ahmedabad

1. Introduction

Production of a commodity requires the use of many factors which may be called as input and the production itself may be called an output. The factors of input might be labour, capital, raw materials, fuel, etc. Thus the production depends upon various factors. But assuming other factors constant, we can know the amount of output for a fixed amount of input or the consumption of input for a fixed amount of output. The ratio of an input of the factor to the output of the commodity is the measure of the productivity in relation to that factor. The choice of the factor depends upon the inquiry.

S. Gupta (1963) [1] has recently worked on the trends of input factors and output in British manufacturing industry. Jaiswal M. C. (1963) [2] has worked on capital productivity and wage capital ratio in various Indian industries. Nicholson and Gupta (1960) [3] have worked on output and productivity changes in British Manufacturing industry. An attempt has been made here to study the trends of various inputs and outputs and the measures of productivity of these inputs. The indices of the various inputs at constant prices and the various ratios have been calculated for different purposes.

2. Method and Definitions

For the sake of clarity, a brief review of the method and definitions is presented here. The present study will cover the statistical data relating to all Indian industries coming under the industrial Act for the years 1952 to 1958. The data are

published in the census of Indian manufactures [4] for various years.

In order to study the trend irrespective of the factors of input the gross output index and net output index for all Indian industries for the year 1955 and 1958, with 1952 = 100, have been calculated at constant prices. The money values from the census of Indian manufactures have been deflated by using the appropriate index number of whole sale prices published in Eastern Economists and Monthly Abstract of Statistics. Thus all money values used here are at constant prices. Gross output is the value of the production total. Value added by manufacture has been considered as the value of net output. Input index has been calculated for all the industries for the years 1955 and 1958, with 1952=100, at constant prices to study its trends

Input is the value, at factory, of materials, fuel, etc. consumed and the amount paid to other concerns for work done for factory. These values have been deflated by the appropriate index number of whole-sale prices. In order to study the employment and labour trend, worker index number has been calculated for 1955 and 1958 (1952=100). Total number of workers has been considered here irrespective of workers and other than workers (i.e. skilled and unskilled). The recent trend in the industry is to replace old machines which require more labour, by new modern automatic machines so that the consumption of labour may be reduced to a certain extent. But this involves more investment and more consumption of fuel in the industry. In order to study this trend, the fuel index has been calculated (with 1952=100) at constant prices for 1955 and 1958. The value of fuel is the total value of coal, electricity, lubricating oils and others. If the old machines have been replaced by modern automatic machines, one worker can operate more machines and hence the consumption of fuel per worker will increase. In order to study this, the consumption of fuel per worker in terms of rupees has been calculated for all industries for 1955 and 1958 at constant prices. In order to study the consumption of fuel in the production of various commodities, the fuel gross output

ratio has been calculated for all industries for 1955 and 1958. This ratio will state the industries which are fuel intensive and hence the location of such an industry should be at a place where sufficient amount of fuel is available. In order to see the proportion of cost of fuel in the total input cost, fuel input ratio has been calculated for all industries. This ratio has been multiplied by 100 and the result will give the cost of fuel per 100 rupees of input. In order to know the consumption of raw materials, etc., i.e. input for an unit amount of output, the input-output ratio for all industries has been calculated. This ratio is sometimes called the technical coefficient. The input-output ratio also throws light on the efficiency of an industry. If there is a decrease in input per unit of output either due to the technical change or the change in the proportion of various factors, we can say that there is an increase in the efficiency of the particular industry. Lower the ratio higher is the efficiency, higher the ratio lower is the efficiency of an industry. The labour productivity is an indicator of the progress of an industry and economic development. The change in total industrial productivity reflects the combined effect of changing productivity within individual industries. Different industries employ different types of labour, therefore, it is advisable to reduce labour to an equivalent unit. Hence, I have considered labour in terms of rupees and found out net output per rupee of wages and salaries to study the labour productivity for all industries. I have considered net output (i.e. value added by manufacture) instead of gross output since the value added is the income concept and the purpose of an economic plan may be to increase income with the unit input of labour.

3. Specific Discussion

There are 29 industries mentioned in the census of manufacturing report. The indices and various ratios discussed above have been calculated for all industries for the year 1955 and 1958 at constant prices. The base year for various indices has been kept the same and it the year of 1952 as this is considered as a base year in most of the indices in India now. The unit

of measurement of various factors has been kept the same and it is in terms of money value which is only a common measure between different industries.

Gross output index

The table 1 gives the index numbers of gross output, net output-input, workers (in persons) and fuel for all industries for 1955 and 1958 (1952=100) at constant prices. The study of table 1 reveals that the gross output index has increased for some industries and decreased for some other industries for 1955 and 1958. This index for all industries has increased by 29% but it is same for 1955 and 1958 indicating the total gross-output has remained unchanged from 1955 to 1958. The maximum increase in this index is that of bicycles and sewing machines. It is 286 in 1955 and 402 in 1958 for bicycles. It indicates that the demand for bicycles has tremendously increased in these eight years. This demand is four times that of the year 1952. Generally the demand for bicycles is from the lower class and lower middle class of people as even most of the workers and labourers own a bicycle now-a-days. This shows the overall progress of an economic development as the workers and labourers who were going for their work on foot are able to purchase bicycles now. So there is nothing wrong if we call this age as an age of bicycle. The next maximum is in sewing machines. This is because of the need of ladies to stitch the clothes at home as the stitching charges have gone up. Now-a-days, generally middle class and lower middle class of people own a sewing machine at home in order to save the expenditure of stitching as they feel short of their income due to heavy rise in prices. The result is the demand for sewing machines has increased much. The other industries which show relatively more increase in output are Starch, Chemicals, General and Electric engineering, Glass and glass ware, Ceramics and Paper and paper board. The indices of these industries are more than 200 in 1958. These all industries are not major industries except General and Electrical Engineering which is connected with iron and

major industries, the index of cotton textiles which occupies the first position in terms of investment as 117 in 1955 and 98 in 1958. This index has increased by 17% in 1955 and decreased by 2% in 1958 in comparison with that in 1952. This shows that the demand of this commodity might have gone down. This may be due to the fact that use of artificial fibres has increased in recent years.

TABLE 1

Index Number for Outputs and Inputs for 1955 and 1958 (1952=100)

Industry	Gross output		Net output		Input		Worker		Fuel	
	Index	1955	Index	1958	Index	1955	Index	1955	Index	1958
1. Wheat Flour	175	196	228	259	167	188	125	140	192	212
2. Rice Milling	183	159	309	171	175	157	138	134	174	157
3. Biscuit Making	104	134	129	163	93	123	83	86	124	136
4. Fruit and Veg. Processing	135	164	136	118	137	176	85	101	130	128
5. Sugar	152	145	136	137	160	147	101	112	147	180
6. Distilleries and Breweries	135	142	143	143	132	148	93	102	136	156
7. Starch	259	360	547	566	219	335	61	74	346	514
8. Veg. oils (excluding edible hydrogenated oils)	132	121	168	177	131	118	112	94	142	105
9. Veg. oils (Edible Hy. oils)	101	144	177	188	95	141	100	98	118	124
10. Paints and Varnishes	135	138	129	150	138	132	116	109	139	147

	Index		Index		Index		Index		Index	
	1955	1958	1955	1958	1955	1958	1955	1958	1955	1958
11. Soap	98	118	85	108	104	123	105	104	113	120
12. Tanning	166	114	130	117	172	114	124	102	171	162
13. Cement	123	141	149	131	107	151	110	157	124	204
14. Glass and Glass ware	161	207	196	258	145	185	113	111	121	157
15. Ceramics	158	221	166	224	143	211	119	151	131	202
16. Plywood and teachests	159	140	163	150	154	131	144	137	202	201
17. Paper and paper board	153	214	175	218	137	205	136	181	146	249
18. Matches	105	110	102	131	103	90	141	111	175	189
19. Cotton textiles	117	98	148	110	104	92	108	104	122	127
20. Wollen textiles	137	151	134	168	136	148	96	109	104	119
21. Jute textiles	87	72	89	88	85	66	93	87	114	133
22. Chemicals	171	227	172	253	171	215	128	155	154	190
23. Aluminium, Copper and Brass	182	190	194	236	180	178	115	119	159	180
24. Iron and Steel	143	164	158	142	128	162	114	119	105	140
25. Bicycles	286	402	304	394	262	402	186	272	249	449
26. Sewing Machines	244	443	284	522	218	389	162	215	212	365
27. Electric lamps	143	152	175	146	130	167	117	138	160	187
28. Electric fans	132	152	146	125	117	159	102	97	199	166
29. Gen. and Elec. Engineering	166	221	160	211	170	248	118	145	146	194
All industry total	129	129	144	139	122	124	109	111	125	154

TABLE 2

Ratios (in percentages) of Input-Gross Output, Fuel-Gross Output, Fuel-Input, Net Output-Wages and Fuel per Worker for 1955 and 1958

Industry	Input Gross Output ratio (%)		Fuel-Gross output ratio (%)		Fuel-Input ratio (%)		Net output Wages (%)		Fuel per Worker in rupees	
	1955	1958	1955	1958	1955	1958	1955	1958	1955	1958
1. Wheat Flour	91	91	1.18	1.16	1.30	1.27	299	329	517	615
2. Rice Milling	91	94	0.98	1.01	1.07	1.07	247	173	129	139
3. Biscuit Making	63	64	2.58	2.18	4.10	3.41	245	284	260	332
4. Fruit and Veg. Processing	62	66	1.69	1.37	2.72	2.09	324	288	139	140
5. Sugar	73	70	1.44	1.86	1.97	2.64	270	270	141	189
6. Distilleries and Breweries	54	56	7.91	8.55	14.96	11.02	284	272	681	857
7. Starch	70	78	4.84	5.19	6.91	6.70	398	327	865	1270
8. Veg. oils (excluding by edible hydro. oils)	94	93	1.68	1.36	1.80	1.46	182	259	365	388
9. Veg. oils (Edible Hy. oils)	86	89	2.05	1.51	2.39	1.70	325	343	864	1128
10. Paints and Varnishes	64	60	0.94	0.97	1.47	1.26	318	378	147	200
11. Soap	68	67	1.52	1.34	2.22	1.55	413	506	416	540
12. Tanning	88	85	0.78	1.07	0.88	1.25	151	169	87	120
13. Cement	49	60	16.98	24.35	34.79	40.75	348	244	2255	3573
14. Glass and Glassware	55	54	16.03	16.17	29.20	29.74	139	174	424	683

While if we consider Woolen textile industry, this index increases by 37% in 1955 and 51% in 1958. This shows that the consumption of woolen clothes has increased steadily. This index for the Jute textiles is 87 in 1955 and 72 in 1958. This index goes on decreasing from 1952 to 1958. The total decrease is by 28%. Hence it can be concluded that the utility of Jute fibres might have gone down due to other substitutes or the raw materials might not be available in enough quantity. This is the only industry which shows the maximum decrease in output in last six years. If we consider Iron and Steel industry which is the important industry for its use in plans shows also an increase of 64% in these six years. On the whole, there is more or less an increase in gross-output in the industrial sector as a whole during these six years.

Net output index :

If we consider net output index from Table 1, we see that this index increases steadily from 1952 to 1958. The index of starch is the maximum among all the indices even though the index of gross output is not maximum. This shows the reduction in the cost of manufacturing the starch by modern techniques resulting the increase in net output. This index is 547 in 1955 and 566 in 1958, so we see that it increased in the period 1952 to 1955 by five times while it has not increased considerably from 1955 to 1958. The demand of starch might be due to its consumption in the cotton textile industry, chemicals industry and the washing companies. The other two indices those of bicycles and sewing machines are 394 and 522 in 1958. The conclusion is the same stated in the above paragraph. The other industries whose net output index is more than 200 in 1958 are Wheat flour, Glass and glass ware, Ceramics, Paper and paper board, Chemicals, Aluminium, Copper and Brass and General and Electrical engineering. The increase in net output index is more than that in gross output index in almost all industries. In Cement, Iron and Steel, Electric Lamps, Electric fans, the gross output index has increased from 1955 to 1958 while the net

output index has decreased during these three years. Hence we can say that the input cost might have increased for these industries during these three years. This index for all industry total has decreased from 144 in 1955 to 139 in 1958 even though the gross output index is constant for these both years. Hence it can be concluded that input cost might have increased relatively resulting the decrease in net output in the industrial sector as a whole.

Input index :

If we consider the input index from Table 1, this index is 402 and 389 in 1958 for bicycles and sewing machines respectively. The index for cotton textile is 104 in 1955 and 92 in 1958 indicating that the input has decreased in this industry. In Paints and varnishes and Match industry this index has decreased from 1955 to 1958 even though the gross output index has increased in these three years. This indicates the cost of input has proportionately decreased which is good for the industry. This index for all industry total is 122 in 1955 and 124 in 1958 which is almost same. So cost of input has remained almost the same for these years.

Worker index :

If we consider worker index from Table 1, it is maximum for bicycle and sewing machine industry. This index is 108 in 1955 and 104 in 1958 for cotton textile industry. This index is 96 and 109 in 1955 and 1958 respectively for woolen textile industry. The gross output index has increased by 37 % in 1955 while the worker index has decreased by 4 % indicating technical change in the industry. The net output and gross output index for starch industry is 566 and 360 respectively in 1958 while the worker index is 74 which is significant. The gross output has increased nearly four times while the employment has instead of increasing has decreased by 26 %. Therefore, it can be concluded that output per worker has increased much because of the technical change in the industry. This industry has progressed much technically also. If we consider vegetable oils (edible

hydrogenated oils), the increase in gross output index is by 44% from 1952-58 while there is a decrease in worker index by 2%. On the whole, worker index has not much increased in comparison with the gross output index indicating the technical change in the industrial sector as a whole. This index for all industry total is 109 in 1955 and 111 in 1958. The increase in employment is by 9% in 1952-55 and by 2% in 1958.

Fuel index :

If we refer the fuel index from Table 1, it is maximum for bicycles and sewing machines. This index for cotton textile industry is 122 and 127 in 1955 and 1958 respectively. The consumption of fuel has increased even though the gross output has not so much increased. This indicates the technical change in this industry. In electric fans consumption of fuel has decreased from 199 in 1955 to 166 in 1958 even though the gross-output index has increased from 132 to 152 in 1955-58. It may be due to the fact that some spare-parts of the fan might have been manufactured from other iron and steel concerns and assembled in some concerns of this industry. This index for all industry total is 125 in 1955 and 154 in 1958 i.e. the consumption of fuel has increased by 54% in 1958 since 1952 in the industrial sector as a whole. The Table 2 gives ratios of input-gross output, fuel-gross output, fuel-input, net output-wages and fuel per worker in terms of rupees for 1955 and 1958. These ratios have been expressed in percentages by multiplying them by 100.

Input-Gross output ratio :

This ratio is maximum for vegetable oils (excluding edible hydrogenated oils) and it is 94 and 93 for 1955 and 1958 respectively indicating that input of Rs. 94/- is required to produce an output of Rs. 100/-. This ratio for cotton textile industry is 62 and 66 for 1955 and 1958 respectively indicating that input of Rs. 62/- to 66/- is required to produce an output of Rs. 100/-. This ratio should remain constant as it has been calculated at constant prices. Increase in this ratio indicates

the increase in the cost of input per 100 rupees of output. This ratio is higher in woollen textiles and jute textiles than that in cotton textiles. This ratio for cement industry increases from 49 in 1955 to 60 in 1958. This indicates an increase in input by 11 % which is maximum among all the industries. The next maximum increase is in Electric lamps and it is 10 % (i.e. 52 to 62). Generally this ratio has increased from 1952 to 1958. This ratio for Paints and Varnishes and Jute textiles has decreased by 4 % which is the maximum decrease among all the industries. This ratio has generally increased in industries connected with iron and steel. This ratio for all industry total is 68 which is constant in both the years. So we can say that the input of Rs. 68/- is required to produce an output of Rs. 100/- in the industrial sector as a whole.

Fuel-Gross output ratio :

The fuel-gross output ratio indicates the amount spent after fuel per 100 rupees of output. This ratio for cement industry is 16.98 and 24.35 for 1955 and 1958 respectively which is maximum among all the industries. The expenditure on fuel is Rs. 17/- to 24/- per 100 rupees of output in cement. In glass industry, the expenditure on fuel is about 16 rupees per 100 rupees of gross-output. The expenditure on fuel per 100 rupees of gross-output in iron and steel industry is Rs. 10/- to 11/-. The proportion of fuel in gross-output in Ceramics, Paper and paper board, Distilleries and Breweries is about 15 %, 8.5 %, 9 % respectively. The maximum difference in this ratio is in cement industry and it is about of 8 %. It indicates that some automatic machines might have been introduced in this industry recently. The proportion of fuel in all industry total is about 4 %. It has slightly increased from 1955 to 1958.

Fuel-input ratio :

The fuel-input ratio gives the percentage of fuel in the total amount of input. This ratio for cement industry is 40 % which is maximum among all the industries. In this industry, the cost of fuel is Rs. 40/- per 100 rupees of input. The

Input and output Trends in Indian Industries

proportion of fuel in input in Glass and glassware, Ceramics and Iron and steel industry is more than 20 %. This proportion is more in Distilleries and Breweries and Paper and paper board and it is about 15 %. These all industries consume more fuel because of its particular process of manufacturing. The location of such industries should be at such a place where fuel is available easily. This proportion in Cotton textile industry, is about 6 %. This proportion has increased from 1952 to 1958 in almost all industries because of the technical change in manufacturing. This proportion for all industry total is 5.34 % in 1955 and 6.49 % in 1958.

Fuel per worker :

From Table 2 we can get consumption of fuel in rupees per worker per year for all industries. In Cement industry, the consumption of fuel per worker per year is Rs. 2,255 in 1955 and Rs. 3,573 in 1958 which is maximum. The consumption has changed much from 1955 to 1958. This change is maximum among all the industries. The next maximum consumption is in iron and steel industry. It has increased from Rs. 1,002 in 1955 to Rs. 1,531 in 1958. The consumption of fuel in wheat flour Distilleries and Breweries, Starch, Vegetable oils (Edible hydrogenated oils), Paper and paper board, Chemicals, Aluminium Copper and Brass is more than Rs. 500/- per worker per year. These industries may be considered as fuel intensive.

Net output-wage ratio :

The Table 2 gives the ratio of net output to wages expressed in percentage. This ratio gives the labour productivity. It gives the net output per 100 rupees of labour input. The net output per 100 rupees of wages for soap industry is Rs. 413 in 1955 and Rs. 506/- in 1958 which is maximum among all the industries. The industries whose net output per 100 rupees of wages is about of Rs. 300/- are Wheat flour, Fruit and Vegetable processing, Starch, Vegetable oils (edible hydrogenated oils), Paints and Varnishes, Cement and Chemicals. The net output for Cotton textiles is Rs. 156/- in 1955 and Rs. 130/-

in 1958. It has decreased from 1955 to 1958. This net output for Woolen textiles has increased from Rs. 167/- in 1955 to Rs. 214/- in 1958. In Iron and steel industry, the net output has decreased from Rs. 233/- in 1955 to Rs. 214/- in 1958. It has decreased from 1955 to 1958 also for Bicycles, Electric lamps, Electric fans, Plywood and teachefts, Rice Milling, Distilleries and Breweries, Starch, and Cement industry. The overall productivity has not increased from 1955 to 1958. The above analysis shows the trend of various inputs and outputs for various industries, for the years 1952 to 1958. It gives the idea of the relative comparison between the various factors within the industry and between the industries for the same factor. The analysis is, of course, subject to the data available.

References

- (1) S. Gupta : 'Input and output trends in British manufacturing industry, 1948-54', Journal of Royal Statistical Society, Series A, Volume 126 (1963), p. 433.
- (2) Jaiswal M. C. : 'Capital Productivity, Distribution of Capital and Wage-capital ratios in Indian Industries' The Journal of Gujarat Research Society (1963), Vol XXV, No. 2/98, p. 117.
- (3) Nicholson, R. J. and Gupta, S. : 'Output and productivity changes in British manufacturing industry 1948-54', Journal of Royal Statistical Society, Series A Vol. 123 (1960), p. 427-459.
- (4) Census of Indian manufactures, 1952-58.

INDIAN FEDERALISM—PROBLEMS AND PROSPECTS

KIRTIDEV D. DESAI

*Department of Political Science
University School of Social Sciences
Gujarat University, Ahmedabad-9*

Federalism is both a constitutional device as well as a philosophy of political integration. Viewed in its comprehensive concept, it covers philosophical outlook, constitutional structure and political processes that bring about national integration. Political integration can be achieved by two ways: (i) Unitary approach, (ii) Federal approach. The Unitary approach creates unity by suppressing and submerging diversities and peculiarities. It is intolerant to diversity and encourages conformity. The second approach is more tolerant towards complexity and diversity of social life. It attempts to achieve unity without sacrificing diversity. It does not consider diversity and unity as antithetical goals; it aims at unity amidst diversity. Such a view of federalism rests upon the philosophy that reconciles seemingly contradictory absolutist and relativist positions. Hence federalism is not merely "a static pattern" but "the process of federalizing a political community".¹ It is not merely a constitutional contrivance; it is, in Arthur MacMahon's phrase, "an Integrative Alternative".² So far as it tolerates and accommodates complexity and diversity of modern life, federalism is more democratic, more humane and more subtle way of achieving political integration.

Unfortunately, many approaches to the study of federalism miss this broader perspective. Many political scientists have viewed federalism in a very narrow and legalistic context. Thus to Kenneth Wheare, it is just "one device, appropriate in

¹ MacMahon (ed.) : *Federalism Mature and Emergent* (New York : Rusell and Russell, 1962), p. 514.

² *Ibid.*, p. 8.

certain circumstances".³ Franz Neumann sees in it only "an expedient that particular circumstances may require".⁴ Further he maintains "the futility of any discussion of the merits of federalism as an arrangement considered abstractly" and observes that "there are no values that inhere in federalism as such".⁵ Such a narrow and pragmatic approach caricatures federalism as an inevitable expedient. It fails on one side to realize the superiority of federalism as an integrative alternative and on the other side to evolve ideological commitment to federalism.

The study of Indian Federalism has also suffered from such a narrow approach. Most of these studies have been predominantly legalistic and have missed the broad philosophical and political perspective. The evolution of the federal concept, motivations behind its adoption, divergent party and group attitudes to federalism, forces working for unity on one side and for autonomy on the other, the inter-actions between these forces and the resultant federal balance, articulation and intensity of the ideological commitment to federalism—all these broader aspects of Indian Federalism have rarely been treated adequately.

The present paper attempts to study some of these aspects. It tries to subordinate constitutional details to broader political dimensions of the integrative process. The attempt is made here to identify forces and trends that strengthen or retard federalism, to assess their strength and potentialities, and to work out prospects of federalism in India.

I. Attitudes and Adoption

Lag between Inevitability and Enthusiasm: A very peculiar feature of the federal growth in India has been a conspicuous gap between its inevitability and enthusiasm for it. By necessity

³ Wheare : *Federal Government* (New York : Oxford University Press, 1964), p. 245.

⁴ MacMahon (ed.) : *op. cit.*, p. 13.

⁵ *Ibid.*, p. 54.

Indian Federalism — Problems and Prospects

and tradition, the choice of federalism was well indicated. On one side facts of sub-continental size and regional diversities necessitated federation; on the other side the Indian tradition and genius has been essentially federal. Since times immemorial India has evolved an assimilative and integrative genius. India assimilated diverse cultures without suppressing their individualities and peculiarities. As Humayun Kabir pointed out, India had a long tradition of cultural and political federalism. It was the effectiveness of this federal philosophy and technique in social, cultural and political life that made the need of constitutional federalism unnecessary and superfluous.⁶ It is widely accepted that the Indian success in assimilating successive wave of foreign culture had been largely due to its federal genius of creating unity amidst diversity. Thus by necessity as well as tradition, federalism was inevitable in India.

In view of its inevitability, lack of articulate and intense enthusiasm for it becomes an intriguing phenomenon. "Curiously although the size, environment and social conditions of India in themselves constitute forceful arguments for federalism quite similar to those found in other parts of the Commonwealth, the proponents of federalism in India could never be said to have attained a firm majority."⁷ In order to understand these strange phenomenon, it would be necessary to analyse the emergence of the federal idea, attitudes of various parties and groups toward it, and circumstances and motivations behind its adoption.

Emergence of the Federal Idea : As soon as the grant of substantial independence became a distinct possibility, the shape of the future government of India agitated the mind of

⁶ Kabir, Humayun : "India and Federalism", *Quest*. No 20 (January-March, 1959), pp. 25-34.

The traditional and cultural basis of the Indian federalism has been nicely treated in Radhakamal Mukerjee : *The Culture and Art of India* (N. Y. Praeger, 1959).

⁷ Leonard : "Federalism in India", in Livingstone (ed) : *Federalism in the Commonwealth* (London : Cassell, 1963), p. 87.

politicians. At the time of announcing the British intention of granting independence to India by stages (August, 1917), Montagu had a vague vision of federal India. He envisaged the future India as "a series of self-governing provinces and principalities, federated by one central government".⁸ The Montagu-Chelmsford Report stated: "Granted the announcement of August 20th, we can not at the present time envisage its complete fulfilment in any form other than that of a Congress of self-governing Indian provinces....."⁹ Thus at the end of the First World War, the federal scheme was hinted as the basis for future constitutional reforms.

However, the clear enunciation of the federal idea came ten years later in the report of the Simon Commission. "The ultimate constitution of India must be federal, for it is only in a federal constitution that units differing so widely.....can be brought together while retaining internal autonomy."¹⁰ The Round Table Conferences in 1931 accepted the federal idea as the basis of the constitutional reform. It was found to be the only instrument that could reconcile claims of the British provinces, the Indian States, the muslim communalism and the British imperial interests. All parties to the Round Table Conferences agreed to the federal formula. The Secretary of State for India, Sir Samuel Hoare, described the agreement as "a turning point in the course of British Empire".¹¹

Thus the period between 1918 to 1931 witnessed the emergence of the federal idea and the growing consensus about it. Indian Princes were enthusiastic about the federal idea.¹² The Muslim League accepted federalism as a part of its Fourteen point programme (March, 1929).¹³ The Congress was

⁸ From his speech in the House of Commons cited in Philips (ed.): *Politics and Society in India* (N. Y.: Praeger, 1962), p. 93.

⁹ Banerjee: *Indian Constitutional Documents*, Vol. III (Calcutta: A. Mukherjee and Co., 1946), p. 225.

¹⁰ Banerjee: *op. cit.*, p. 225.

¹¹ *Ibid.*, p. 236.

¹² See speech of the Maharaja of Bikaner cited in Banerjee: *op. cit.*, p. 360.

¹³ *Ibid.*, pp. 245-249.

largely in favour of the unitary constitution. Thus the Nehru Committee Report had drafted a unitary constitution; it referred to a full-fledged federation as only a possibility.¹⁴ However in July 1931, the Congress accepted the principle of federation. The Congress was conscious that it was making a concession to divisive forces. It described it "as a compromise between the proposals based on undiluted communalism and undiluted nationalism".¹⁵ By the end of 1931, the federal idea had fully emerged and had been widely accepted.

Superficial Acceptance and Underlying Suspicion : The superficiality of this consensus became evident in the reactions of various parties to the 1935 Act. All were agreed on the vague concept of federalism; but moment the attempt was made to give concrete shape to the idea, the differences became obvious. The 1935 scheme of federalism could satisfy no one; hence it was rejected by all parties. Thus the Indian commitment to federalism remained superficial and reserved. This does not mean that there was any opposition to the federal idea as such. All national leaders accepted the desirability and the necessity of federalism in the Indian context. But due to various factors, federalism became associated with divisive forces and imperialist intrigues. Federalism was always presented as a price for freedom or integrity of India. To the mainstream of Indian nationalism, federalism remained a suspect. It was an irritating price to be paid either to achieve independence or to avoid partition of India. Hence, if on one side, there was no substantial opposition to it; on the other side, there was also no great enthusiasm for it. Federalism remained a pawn in the frustrating bargain politics; it never rose sufficiently high to become the symbol of an ideological commitment.

Many factors contributed to these ideological indifference and emotional coldness to federalism. Firstly, the acceptance of the inevitability of federalism reminded the nationalists of

¹⁴ *Ibid.*, pp. 201-207.

¹⁵ *Ibid.*, p. 250.

imperfect or weak nationalism. The nationhood of India was a thing to be asserted in face of the challenges of foreign doubters. In fact a continuous and acrimonious debate had been going on between the Britishers and the Indian nationalists on the subject of whether India is a nation or not. The affront from the foreign critics was serious. Thus Jhon Strachey said : "There is not and never was an India." John Seely maintained : "The notion that India is a nationality rests upon that vulgar error which Political Science principally aims at eradicating. India is not a political name, but only a geographical expression."¹⁶ In face of such a challenge, the assertion and insistence of the perfect nationalism became a patriotic emotionalism. To admit of imperfect nationalism and hence necessity of federalism became a sign of unpatriotism and humiliation. Even Jawaharlal Nehru was not free from such emotional overtones. He often got irritated when reminded of many languages and retorted that Germany also had fifty to sixty dialects.¹⁷ "I know there are men who deny us the right of calling ourselves a nation. According to these superficial observers, we can have nothing in common because we talk different dialects.... and because the shape of our turbans are striking in their diversity."¹⁸ In such an atmosphere of emotional retaliation, the tendency was to over-emphasize unity and to forget diversity. Hence federalism never became popular with the mainstream of Indian nationalism.

Secondly, federalism was viewed as an imperialist device to keep India divided. Even A. B. Keith accepts the validity of this suspicion of the colonial federalism being "simply an aspect of divide and rule".¹⁹ Such a suspicion was typically

¹⁶ Rajni Palm Dutt : *The Problem of India* (N. Y. : International Publishers, 1943), p. 89.

¹⁷ Nehru : *An Autobiography* (London: The Bodley Head, 1958), pp. 452, 453.

¹⁸ Bondurant : *Regionalism versus Provincialism : A Study in the Problems of Indian National Unity* (Berkeley : University of California, 1958), p. 9.

¹⁹ Keith : *A Constitutional History of India 1600-1935* (London : Oxford University Press, 1936), pp. 473-474.

expressed in a pamphlet by the Hindu Mahasabha : "the British want us to have a federal constitution, so that... this ancient land of Bharatvarsh may break up into so many small states.. and this country may never rise as a first rate power in the world as a rival to Europe."²⁰

Thirdly, the federalism consisting of the British provinces and the Indian states held the prospects of these native states with their dynastic autocracy becoming a permanent feature of Indian life. The Congress realized the danger of accepting a scheme wherein monarchical states might get permanent protection of federal autonomy. In view of this fear, federalism was often suspected to be a conspiracy between the British imperialists and the native princes. Jawaharlal Nehru expressed this sentiment thus : "They (Indian states) look, still as of old, to this imperialism for protection, and the British imperialism looks to them for support against the powerful nationalism of Indian people.... The whole scheme of federation contained in the 1935 Act was aimed to give strength and stability to this combination and to disable the Indian people from challenging it effectively."²¹ This suspicion was not quite unfounded.²²

Fourthly, federalism became a battle-cry of divisive forces challenging the national integrity. The Muslim League and the native states demanded the federation with the ridiculously minimum central government. The Congress had to accept the demand of this minimal federation as only alternative to prevent the partition of the nation. The Cabinet Mission proposal led to a plan of three-tier federation. The Congress was painfully conscious that it was being forced into the federal scheme, that would make effective and meaningful national government an impossibility. Thus federalism came to be increasingly associated as a symbol of concession to and appeasement of divisive forces.

²⁰ Harrison : *India—The Most Dangerous Decades* (Princeton : Princeton University Press, 1960), p. 313.

²¹ Nehru : *The Unity of India* (N. Y. : John Day Co., 1948), p. 47.

²² Keith : *op. cit.*, pp. 473-474.

Fifthly, federalism became a suspect as it was increasingly championed by the Communist party, which evolved "the concept of multi-national India" and talked about "the sixteen Indian nations".²³ Such an extreme Communist advocacy for federalism made it a Communist instrument to disintegrate India and to create chaos. In its 1945-46 election manifesto, the Communist party demanded full sovereignty and the right of secession for the states.²⁴ Further, the solitary Communist member in the Constituent Assembly did move an amendment proposing the right of secession.²⁵

In view of these five major factors, there is no wonder that federalism remained largely a suspect in the minds of Indian nationalists. This is not to say that the federal principle was rejected or hated. In view of the Indian context, its need was deeply felt and accepted. However, this can explain the relative absence of articulation of and enthusiasm for federalism. Viewed thus, the lag between its inevitability and enthusiasm about it becomes explicable.

Adoption and Reactions : In spite of these mental reservations and emotional coldness the Congress had accepted the principle of minimal federation in all sincerity. On December 9, 1946, Jawaharlal Nehru moved the historic Aims and Objectives Resolution in the Constituent Assembly. In that resolution the goal of minimal federation with residuary powers to states was declared.²⁶ Though the Muslim League had boycotted the Constituent Assembly, all cares were taken to accommodate its susceptibilities and to keep doors open for its entry. "So long as there was even the remotest chance of the League's coming in.....the Assembly would not commit itself to the strong

²³ Overstreet and Windmiller : *Communism in India* (Bombay : Perennial Press, 1960), pp. 492-492.

²⁴ *Ibid.*, p. 498.

²⁵ Raju : *Union-State Relations in India with particular reference to development, planning and administration*. (The Doctoral Dissertation—Syracuse University) (Ann Arbor : University Microfilms, 1961), p. 22.

²⁶ *Ibid.*, pp. 16-17.

centre which most non-Muslim opinion considered to be in the best interests of the country."²⁷

The dramatic change occurred with the decision on partition. With the partition, the need of minimal federation to appease the Muslim League disappeared. It is noted that the possibility of creating a strong central government was one of the reasons that induced Sardar Vallabhbhai Patel in accepting the partition.²⁸ The partition removed from the scene the Muslim League that was interested in the demand of minimal federation. Hence there occurred a swing from a federation with weak centre to one with very strong centre. "The main constitutional result of the partition of India was that the pendulum swung from one extreme to another extreme. From the idea of minimal federation, almost all leaders and, much more than the leaders, the followers wanted a maximal federation."²⁹ The bitter consequences of the partition, the threat posed by the Indian states to the national integrity, the assassination of Mahatma Gandhi, the Communist terrorism in Andhra—all these contributed to the growing sentiment for maximal federation. Even the word "federation" was nowhere used in the Constitution. India was not a federation but a "Union of States".

The emergent constitutional scheme was a federation with many unitary features. There were voices of protests against this overcentralisation. The abandonment of original scheme was regretted. A very highly placed leader like Sampurnanand said: "The attempt at centralisation is hardly veiled and provincial governments have been sought to be reduced to the position of agents of the centre."³⁰ However such protests proved to be mere cries in wilderness; they were too weak to halt the surging tide of the enthusiasm for the strong centre.

²⁷ Lumby : *The Transfer of Power in India—1945–47* (N. Y. : Praeger, 1954), p. 156.

²⁸ Santhanam : *Union-State Relations in India* (Bombay : Asia Publishing House, 1960), p. 60.

²⁹ *Ibid.*, p. 4.

³⁰ Philips (ed.) : *op. cit.*, p. 159 (The Speech in the Constituent Assembly).

II. Constitutional Framework and Federal Pattern

Though the framers of the constitution consciously avoided the word 'federation', the new constitution was largely federal in its pattern and structure. Throughout the debates of the Constituent Assembly, federalism was accepted as a form of polity, that was most suited to the Indian traditions and needs. There appeared no serious challenge to the federal idea; none seriously advocated the unitary alternative. However, in the light of the partition holocaust and the problem of the Indian States, the fear of national disintegration loomed large. This led to the grafting of few significant unitary features on the federal pattern as a safeguard against disintegration.

Federal Scheme : The Constitution created India as "a Union of States". Thus it posited a dual polity. On the one hand there is a Union government at the centre; and on the other hand there are sixteen state governments in the states.³¹ The legislative, financial and administrative powers are distributed constitutionally between these two sets of governments. The constitution also embodies the supremacy of the constitution as well as the judicial review by the Supreme Court. The amendment of the federal parts of the constitution requires the consent of not less than one half states.³² Thus the Indian constitution has adopted the basic features of federalism. No doubt it has adopted many features that are uncommon; but they are neither unprecedented nor repugnant to the federal structure. Thus from the Canadian federation, India adopted the features of the unequal representation of states in the upper house of the federal parliament, the states having no right to frame their constitutions, the single citizenship, and single

³¹ At present the Indian Union consists of the sixteen states and the six Union territories, administered by the Union government. Prior to the re-organization of the States in 1956, the Indian Union consisted of 30 units—Parts 'A' States 10; Part 'B' States 8; Part 'C' States 10; Part 'D' territories 2.

³² Basu : *Commentary on the Constitution of India* (Calcutta : Sarkar and Sons, 1955), Vol. II, p. 579.

unified and integrated judicial system.³³ Such features can go well with the federal principle; they are neither differential of federalism nor repugnant to it.

Legislative Relations : The Chapter I of the Part XI of the Indian Constitution lays down the scheme of legislative relations between the Union and the State governments. The Indian Constitution has adopted a three-fold distribution of powers between the Union and State governments: (i) List I or the Union list: 97 items—Defense, foreign affairs, banking, currency, etc. (ii) List II or the State list: 66 items—Public order and police, local government, public health, agriculture, education, etc. (iii) List III or the Concurrent List: 47 items—Marriage, contracts, labour welfare, social and economic planning, etc.³⁴ The Union Parliament has exclusive powers of legislation regarding the List I; and the State legislatures, the List II. Both can legislate in regard to the Concurrent List; but in case of conflict, the Union law prevails. The residuary powers rest with the Union Parliament.³⁵ This three-list scheme has been adopted from the Government of India Act, 1935.

Briefly, stated, the states enjoy exclusive powers of legislation in regard to the 46 items enumerated in the List II. In this sphere of subjects, they enjoy constitutional autonomy. However, there are four exceptional cases, where the Union Parliament can legislate even on the subjects enumerated in the state list. Firstly, if the Council of States (the upper house of the Union Parliament) passes a resolution by two-thirds majority asking the Union Parliament to legislate on the state subject specified in the resolution, it shall be lawful for the Parliament to so legislate. Such power will rest with Parliament only so long as the resolution remains in force.³⁶ Secondly, the Parliament

³³ For more details see: *Ibid.*, Vol. I, pp. 12-18.

³⁴ Art. 246 and Schedule VII.

³⁵ Article 248.

³⁶ Article 249.

is empowered to legislate on all the state subjects when the Emergency is declared by the President of India.³⁷ During the period of the Emergency proclamation, the federalism is obviously suspended and the unitary polity is established. Thirdly, if two or more states request the Parliament to legislate in regard to some state subject, the Parliament can legislate in regard to those subjects and those states.³⁸ This article is analogous to the Section 51 of the Australian Constitution; it embodies the principle of voluntary delegation. Fourthly, the Parliament has power to make any law for the purpose of implementing any treaty, agreement or convention with any other country or countries.³⁹ This clause embodies the superiority of international commitment to the constitutional distribution of powers. Article VI of the American Constitution, Sec. 132 of the Canadian Constitution, Sec. 51 of the Australian Constitution—all these belong to the same category of provision.⁴⁰

Thus the state sovereignty in its enumerated sphere is subject to these four modifying exceptions.

Financial and Administrative Relations: Learning from the bitter and frustrating experiences of the American and Australian federations, the Indian Constitution gave up the principle of concurrent taxation. It adopted the detailed distribution of tax resources between the Union and the State governments. Thus the State list contains 19 items of revenue. Some of them are land revenue, liquor and opium excise, stamps, agricultural income-tax, sales and purchase tax, taxes on professions and trade, etc. There is no tax item in the Concurrent list. The Union list contains 12 revenue items.⁴¹ However, the Union government is not to appropriate all income from these tax resources. It is obliged to share them with the state government.

³⁷ Article 250.

³⁸ Article 252.

³⁹ Article 253.

⁴⁰ Basu : *op. cit.*, Vol. I, pp. 287-288.

⁴¹ For details See Basu : *op. cit.*, Vol. II, pp. 327-338.

In order to understand this sharing of revenue, the more detailed analysis of the Union revenue resources is necessary. These Union taxes fall into five groups : (i) Exclusively Central : customs, corporation tax, capital tax. (ii) Obligatory Sharing : Income tax is to be levied and collected by the Central government; but its proceeds are to be shared with the states in accordance with the recommendation of the Finance Commission.⁴³ (iii) Voluntary Sharing : The Union government may share Excise duties with the states, if it is so desires.⁴⁴ (iv) Levied and collected by the Centre but given to the States : Succession and Estate Duties, Sales tax on newspapers, taxes on railway passengers and goods etc.⁴⁵ (v) Levied by the Centre but collected and kept by the States : es. Stamp duties, Excise duties on medicinal and toilet preparations.⁴⁶ Thus the scheme of the tax division is somewhat complicated. The states have exclusive control over 19 tax resources; while the Union government, over three. Income tax proceeds are subject to obligatory sharing; and those of excise duties, to voluntary sharing. The seven taxes are to be levied by the Centre but to be appropriated by the States.

With a view to provide a fair and impartial machinery to effect this intricate and complex sharing of revenues, the Constitution provided for the creation of the Finance Commission under Article 280. The President appoints the Finance Commission at the expiration of every five years. The Commission makes recommendations in regard to sharing of taxes and duties, the principles regarding grants-in-aid, terms of inter-governmental financial agreements and any other matters referred to it. This article accords the constitutional status to the healthy non-constitutional institution of the Federal Grants Commission developed in the Australian federation. So far three Finance Commissions have been appointed in 1951,

⁴³ Article 270

⁴⁴ Article 272

⁴⁵ Article 269

⁴⁶ Article 268.

1956 and 1961. On the whole, the successive Finance Commissions have progressively given more and more share to the state governments.⁴⁶

Over and above these shared revenue, the Union government may give either loans or grants to the State governments.⁴⁷ Thus the Constitution has consciously tried to avoid both the confusion of the concurrent taxation and the rigidity of the divided taxation. It attempts to provide clarity by distribution of tax resources and flexibility by provisions of shared taxes, loans and grants.

Even in the field of administrative relations, this spirit of separation and co-operation is evident. Instead of the dual administrative machineries, the constitution provides for the single administrative machinery. Articles 256 and 257 require the States to enforce the Union laws; it also empower the Union government to issue necessary instructions for this purpose. Further Article 258 provides for the voluntary delegation of executive powers from the Union to the State governments. Thus administrative machinery of the Union government is limited to the discharge of its exclusive functions as Defense, Foreign Affairs, Railway, Collection of income tax and excise duties etc. There is no separate administrative machinery for implementation of various Union laws and for routine administrative functions.

The Union and State governments are empowered to create their own Public Civil Services. However Article 312 provides the scope for voluntary co-operation. If the Council of States resolves by two-thirds majority, the Parliament can create one or more All-India services common to both the Union and the States. Thus the Constitution has created three types Civil Services—the State Civil Services, the Union Civil Services and the All-India Civil Services. The emergent pattern of financial as well as administrative relations provides for both flexibility

⁴⁶For detailed discussion see Santhanam : *op. cit.*, pp. 33-40.

⁴⁷Articles 282, 292, 293.

and co-operation without at the same time sacrificing requisite autonomy.

Unitary Features : There are some major features in the Constitution that modifies the federal pattern. It is not contended that they are bad in themselves; but it is suggested that they may constitute potential dangerspots to federalism.

Firstly, Article 3 is inconsistent with the federal principle. It empowers the Parliament to change the boundaries of the states, to create new states, to merge the states in larger units or to divide them etc. Such changes can be carried out by simple majority, are not deemed to be constitutional amendments, and do not require the consent of the States concerned. Thus the states in the Indian Federation are not "Indestructible" nor do they possess the guarantee of their integrity. The principle of the integrity of states is violated by this Article. The said Article was not put in the Constitution without a purpose. At the time of the Independence, the states were heterogeneous and lacked cultural or regional homogeneity. In fact the reorganization of states on cultural and regional grounds should have logically preceded the formation of the federation. However due to exigencies of the circumstances, this huge task of states reorganization was postponed to a later opportunate moment. The Article was inserted with a view to facilitate this impending task of States reorganization. But now as the States reorganization is complete, the removal of this Article from the Constitution will make it more consistent with federalism.

Secondly, Article 249 requires a close watch. The Council of States in effect can transfer any State subject to the Union Parliament for a temporary period, if it so resolves by two-thirds majority. In view of the unequal representation of the States in the Council of States and the increasing submergence of state-lines into party-lines in the Council, this provision is open to misuse. Either a combination of few large states or a

dominant political party can impose a temporary Central encroachment on the state subjects.

Thirdly, the provision of the appointment of the State Governors by the President has created a tricky situation. The original provision of the elected Governor was given up in the favour of the appointed Governor in May 1949. In view of the fact that the Governors were supposed to have no real powers, the mode of their selection was considered to be immaterial. Thus Dr. Ambedker, the Chairman of the Drafting Committee, said in the Constituent Assembly : "The Governor has no functions which he is required to exercise either in his discretion or his individual judgement. According to the principles of the Constitution, he is required to follow the advice of his Ministry in all matters....If the Governor has no powers.....then it seems to me that the question whether he is elected or appointed is a wholly immaterial one." If this is a true constitutional position, then the said question is evidently immaterial. However, the position has remained somewhat vague both in the theory and practice. Thus Article 163 (1) lays down that the Governor will be subject to the ministerial advice "except in so far as he is by or under this constitution required to exercise his functions or any of them in his discretion."⁴⁸ Hence the Governor will not be required to act under the advice of his ministers in those cases, where he is expected to act in his own discretion. The only specific mention of the discretionary power of the Governor occurs in paragraph 18 (3) of the 6th Schedule; the provision gives some power to the Governor of Assam to act in his discretion in regard to some matters relating to the tribal areas of Assam. Many law court decisions have affirmed that the Governor has no discretionary powers, except specifically mentioned.⁴⁹ In view of this solitary instance, the 'discretion' provision in Article 163 is considered

⁴⁸ Cited in Pylee : *Constitutional Government of India* (Bombay : Asia Publishing House, 1960), p. 460.

⁴⁹ Basu : *op. cit.*, Vol II, p. 2.

by many constitutional experts "a drafting anomaly".⁵⁰ However, this drafting anomaly remains a loophole; the attempts have been made to evolve the theory and practice of the wide discretionary powers of the Governor. Thus Pylee makes a laboured attempt to prove that Governor was consciously intended to be an agent of the Central government in certain situations⁵¹. However, the doubt persists. Further, the Governor has been encouraged by the Congress party to act in his own discretion in the cases of doubtful validity. Thus the Governor of Kerala acted (in 1959) twice against or without the consent of the state ministry (i) while he reserved the Kerala Education Bill for the consideration of the President under Article 200 (ii) while he reported the constitutional breakdown of the Government in Kerala, on the basis of which the President proclaimed the Emergency under Article 356. Both Articles do not mention that the Governor should "act in his discretion". Further, the Governor accepted the advice of the defeted ministry to dissolve the state legislature in 1954; while he rejected the similar advice in 1955.⁵² It is significant to note that in the first case the ministry belonged to the Congress; while in the second, to the opposition party. Moreover, when the Congress ministries lost majority support in Madras (1952) and Orissa (1958), the opposition claimed workable majority. However the Governor ruled out their claims and never allowed them to form the government and to objectively test their support by seeking a vote of confidence.⁵³ These events indicate the dangers inherent in the situation. It is not that the Governors acted, as they did in these cases, without justification or with malafide intentions. But the events prove the possibility of mischief as well as the need for early corrective.

Fourthly, Article 201 lays down the Presidential veto over State legislation in certain circumstances, whenever the

⁵⁰ Basu : *op. cit.*, Vol II, p. 8.

⁵¹ Pylee : *op. cit.*, pp. 458-465, 469.

⁵² *Ibid.*, p. 472.

⁵³ *Ibid.*, p. 470.

Governor reserves a bill for the consideration of the President under Article 200. Such reservation is obligatory in case of bills affecting the powers of the High Courts; this is introduced with the intention of safeguarding the powers of the High Courts against whims or vindictiveness of the State governments. In other situations, the reservation is voluntary. In fact it is advantageous for the State governments to reserve some bills for the Presidential assent. On the Presidential assent, they acquire immunity against repugnancy either due to the fundamental right of property or due to the conflict with the Union legislation in the concurrent list.⁵⁴ Thus in itself, the Article is not objectionable. But if the Governor acts 'in his discretion' (which he is not expected to do) in deciding the cases for the voluntary reservation, it can toll the death-bell for federalism.

Fifthly, the federation is intended to be suspended in case of emergency. This modification of federalism was clearly intended and consciously incorporated in the Constitution. So far the national emergency under Article 352 has been declared once in the event of the Chinese aggression in 1962. It is still in operation. The proclamation of emergency under Article 356, upon the failure of the constitutional machinery in States, were declared six times : (i) Punjab 1951, (ii) Pepsu 1953, (iii) Andhra 1954, (iv) Travancore-Cochin 1956, (v) Kerala 1959, (vi) Kerala 1964. Most of them were declared in the cases of the lack of clearcut majorities. Only the Kerala emergency in 1959 was issued in doubtful circumstances. In that case the Communist Ministry had a majority of two votes; and it never lost majority support in the legislature. The opposition parties were conducting mass-agitation to oust the Communist Ministry; the situation was tense and the loyalty-divisions in the State were sharp. In such a situation, the Governor reported (without the consent of the State ministry) that the constitutional machinery had broken down; and on the strength of that report, the President declared the emergency proclamation. This case has

⁵⁴ Santhanam : *op. cit.*, pp. 22-23.

been a highly controvertial one. Anyway, it is a highly objectionable precedent. Any unscrupulous government at the Centre can manoeuvre a mass-agitation and dismiss the State government belonging to the opposite party. Either a healthy convention or a constitutional amendment is urgently needed.

These five features of the Constitution represents either significant modifications of or unconscious encroachments on the federal principle. They have not been misused so far except in one or two solitary cases. The break up of one-party domination may further reduce the actual potentiality of their misuse. However, their presence is ominous enough. They deserve a careful watch and an eternal vigilance.

Nature of the Constitution : The above survey of the federal and unitary features of the Indian Constitution raises the oft-debated question as to its true nature or category. The assessment of the nature of the Indian Constitution has varied from the unitary to the federal one. Each advocate picks up the features supporting his hypothesis and underplays the features contradicting his hypothesis. Hence the controversy has remained inconclusive.

Many contradictory and often conflicting attributes have been ascribed to the Constitution. It is characterised as unitary, federal in form but unitary in spirit, quasi-federal, unitary with federal features, federal with unitary features etc. It is obvious that India has not adopted federalism completely. The pressures of circumstances and needs have dictated significant innovations and modifications.

However even after conceding all these modifications, the constitutional pattern remains basically federal. As Dr. Ambedker explained in the Constituent Assembly : "The chief mark of federalism lies in the partition of the legislative and executive authority between the Centre and Units by Constitution. This is the principle embodied in our Constitution. There can be no mistake about it. It is therefore wrong to say that the States have been placed under the Centre. The Centre cannot

by its own will alter the boundary of this partion."⁵⁵ This evaluation was supported by Alexandrowicz: "India is undoubtedly a federation in which the attributes of statehood are shared between the Centre and local states."⁵⁶

The Indian federation has been modified in two respects. Firstly in times of emergency federalism is suspended in favour of the unitary form of government. But except in times of emergency or in case of the failure of constitutional machinery in states, the State governments enjoy for all practical purposes the constitutional autonomy as well as the coordinate status. Secondly, some features have been incorporated with a view to facilitate co-operation between the Union and the State governments. Thus the wide concurrent field, the provisions for voluntary delegations of legislative and executive powers, the Zonal Councils, the common administrative machinery and Civil Services — all these create a federation with full facility of close and continuous co-operation between the units. Hence the co-operative federation has been instituted instead of a competitive one.

In brief, the federal constitution has been adopted in all seriousness; but the care is taken to see that it may not become a handicap either in times of emergency or in the course of effecting voluntary co-operation.

III. Federalism Superseded — Impact of Planning

Federation and Planning : Like the federal idea, the concept of planning also has a long tradition of gradual evolution. Since Mr. Visweswaraya, the then Prime Minister of the Princely state of Mysore, envisaged the plan for the whole of India in 1934, planning has remained a lively issue. The establishment of the National Planning Committee of the Congress in 1938, the creation of the Department of Planning and Development in the Central government in 1944, and the appointment of the

⁵⁵ Cited in Pylee : *op. cit.*, p. 515.

⁵⁶ Cited in Pylee : *op. cit.*, p. 541.

Advisory Planning Board by the Interim Government in 1946—all these indicate various phases of the growth of the planning concept.

However, these two evolving concepts of federalism and planning remained, somewhat segregated and oblivious of each other. The inherent contradiction between planning and federalism was hardly realized or envisaged. Hence, planning never figured prominently in the debates of the Constituent Assembly. Planning is mentioned only once in the Constitution as item No. 20 of the Concurrent list; it reads as 'Social and economic planning'.⁵⁷ Thus planning was never thought of as an integral part of the federal constitution; it was definitely, in this sense, an afterthought.

Planning—Basis and Machinery: The whole planning is carried out in India in an unprecedented and informal manner. The Planning Commission has neither a constitutional nor a legal basis. It was established in 1950 by the executive order of the Union ministry. The plans also never take the form of legislation of either the Union or the State legislatures. Thus planning has rested for its authority and implementation of informal acceptance by the various governments concerned. Obviously planning has only non-constitutional and non-legal status.

The Planning Commission represents the chief fulcrum of the planning machinery. It consists of eight members—four ministers of the Union government and four other members appointed by it. The Prime Minister traditionally acts as Chairman of the Planning Commission. In order to ensure the consent and co-operation of the States, the National Development Council was created in 1952. It consists of the Union Cabinet Ministers, the Chief Ministers of all the states, and the members of the Planning Commission. The National Development Council was also created merely by the executive order of the Union government.

⁵⁷ Santhanam : *op. cit.*, p. 44.

Generally, the process of planning is centralized in and monopolized by the Planning Commission. The preparation of the broad framework and targets by the Planning Commission, the preparation of the individual plans by the Union and State governments, negotiations over and scrutiny of these plans by the Planning Commission, the final draft plan, the discussion and consent by the National Development Council, the general debate in the Union Parliament—these are the successive stages of the planning process. The plan is neither voted in the Parliament nor discussed in the State legislatures.

A Super Cabinet : Such a pattern of planning has led to momentous modifications of the scheme of government, envisaged originally in the Constitution. Its impact is noteworthy in two directions: Firstly, it has created a body of immense powers not responsible to the Parliament. Thus it has somewhat superseded the parliamentary control over the policy-formation and public-expenditure. It is true that ultimately the individual schemes of the plan depend on financial sanction of either the Union Parliament or the State legislatures; but the whole scheme reduces the sense of direct control of policy and finance in so immense and significant a sphere. Secondly, planning has superseded the state autonomy. After a detailed and incisive analysis of the planning process, Wilfred Malenbaum demonstrates the insignificant and ineffective part played by the states in the formulation and endorsement of plans.⁵⁸ K. V. Rao has tried to prove in a learned article this growing usurpation of the powers of the State governments. According to him, the Planning Commission and the Central Government are in practice usurping powers which it does not formally possess even under the present Constitution.⁵⁹

⁵⁸ Malenbaum : "Who does the planning?" in Park and Tinker (ed.): *Leadership and Political Institutions in India*. (Princeton: Princeton University Press, 1959), p. 305.

⁵⁹ Rao : "Centre-State Relations in Theory and Practice", *Indian Journal of Political Science*. (October-December, 1953), pp. 247-355.

Hence Planning has resulted in the supersession of the parliamentary responsibility on one hand and in that of federalism on the other. No less a person than Asok Chanda characterized the Planning Commission as "the Economic Cabinet not merely for the Union but also for the States".⁶⁰

Uniform Planning and Federal diversity : The "single, centralized, comprehensive, co-ordinated national plan" as adopted in India violated the basic assumptions of federalism. The essence of a federal system is the recognition of diverse conditions and needs of various regions. The acceptance of regional diversity and desirability of allowing the regions to choose their own pattern of development in regard to the subjects transferred to them — these two are the basic motivations as well as the rationale behind the adoption of federalism.

Thus, while federalism is based on the assumption of heterogeneous polity; the Indian Planning has acted largely on the assumption of homogeneous nationality. The Planning has presumed uniformity of needs and conditions in the various regions and disregarded their diversity. It has tried to enforce uniform policies on such state subjects as education, land-tenure system, land-ceiling, co-operative farming on all the State governments.⁶¹ As Santhanam appropriately observes: "On the contrary, planning has been perverted and valuable money squandered in the attempt to enforce uniform policies in respect of matters which the constitution wisely decided to leave to the states as they require differing policies on account of geographical, climatic, historical and other differences."⁶² The magnitude of this submergence of the federal diversity can be judged from the figures of the plan outlays on the state subjects. The plan outlay on the state subjects read as under: (i) *The First Plan* : 1427 out of the total of 1960 crore Rupees; (ii) *The Second Plan* : 1981 out of 4600; (iii) *The Third Plan* : 3847

⁶⁰ Asok Chanda: *Indian Administration* (London: Allen & Unwin, 1958), p. 92.

⁶¹ Santhanam: *op. cit.*, pp. 48-51.

⁶² Santhanam: *Democratic Planning — Problems and Pitfalls* (Bombay: Asia Publishing House, 1961), p. 10.

out of 7500.⁶⁸ Thus the state plans have constituted always more than sixty-five per cent of the total plan outlays.

Planning has enforced uniformity where the federal constitution has desired diversity.

Growing Financial Dependence of the States: With the advance of planning, the financial dependence of the States on the Union government have grown immensely. The most of the schemes of the plans belonged to the state subjects; but the States failed to provide the adequate resources for financing the plans. Hence partly to avoid the virtual break-down of the plan targets and partly to win over the reluctant co-operation of the State governments for the implementation of the plans, the Union government launched on the ever-expanding programme of massive financial assistance.

The resultant growth of financial dependence of the States is presented in the adjoining table. The picture is self-eloquent and hardly needs a comment. The States are depending for more than sixty per cent of their total expenditure on the Central assistance.

Table : Growth of the financial assistance to the States*
(in Crores of Rupees)

Sr. No.	Types of assistance	First Plan (1951-56)	Second Plan (1956-61)	Third Plan (1961-66)
1.	Share of taxes duties	326	712	1191
2.	Statutory Grants	103	207	333
3.	Other Grants	185	539	969
4.	Loans	799	1411	2948
5.	Total aid	1413	2869	5478
6.	Percentage of Central aid to the total finances of the State plans†	39.0	52.2	63.2

⁶⁸ Government of India : *Third Five-year Plan* (Delhi: The Manager of Publications, 1961), pp. 32, 88, 89.

* Constructed from : *Report of the Finance Commission, 1965* (Delhi : Manager of Publications, 1966), p. 191 (Table 19).

† Based on Bhargava : *Indian Public Finances* (London : Allen and Unwin, 1962), pp. 234, 243, 256.

At the end of March 1960, the loans from the Central government constituted 75.3% of the total debts of the States.⁶⁴ Most of the States are finding it difficult to repay these loans; many times the States had to take further loan to pay interest on the loan.⁶⁵ The mid-term appraisal report of the Third Plan gives details of this sorry state of affairs.⁶⁶ Further, "The Third Finance Commission pointed out that many states feel there is a trend towards centralization of resources and also of certain State functions. In its view, a disturbing feature is the increasing dependence of the States on central assistance."⁶⁷ Evidently, such a huge financial dependence and constitutional autonomy can not co-exist for long.

Threat to Federalism : The overall impact of the centralized planning has been the virtual supersession of federalism. There is inherent contradiction between planning and federalism. "There can be no doubt that federal states and welfare states do not go well together. National, economic and social planning demands centralization, which is precisely what federalism seeks to prevent."⁶⁸

Unless planning is divided into the two levels of the National planning done by the Central government in regard to the Union list subjects and the Regional planning done by each state in regard to the State-list subjects, the idea of planning will remain anti-thetical to that of federalism. However as far as the present situation is concerned, planning constitutes a threat to federalism. "There has been concentration of economic, political and financial power at the Centre, which endangers the future of federalism in India."⁶⁹

⁶⁴ Bhargava : *Indian Public Finances* (London : Allen & Unwin, 1962), pp. 234, 243, 256.

⁶⁵ *Ibid.*, p. 174.

⁶⁶ Government of India : *The Third Plan : Mid-Term Appraisal* (Delhi : The Manager of Publications, 1963), p. 32.

⁶⁷ Mukherjee : *Current Affairs—1962* (Calcutta : A. Mukherjee and Co., 1962), p. 549.

⁶⁸ Hicks, et al : *Federalism and Economic Growth* (N.Y. : Oxford University Press, 1961), p. 55.

⁶⁹ Bhargava : *op. cit.*, p. 221.

IV. Federalism Superseded—Impact of Party-system

Federal Polity and Unitary Parties: The next important factor, that contributed to the supersession of federalism, has been the unitary nature of the Indian party-system.

All the political parties have emerged as highly centralized organizations. The central high commands of all parties tried to decide policy-lines as well as details concerning all subjects—the Union subjects as well as the State subjects. The highly centralized decision-making at the level of the central committee, a very strict and often stifling imposition of discipline on the state units, and overwhelming predominance of the national leadership over the state-leadership—these have been the features common to all parties.

This presents a unique phenomenon of the parties, unitary in structure and operation, trying to operate the federal polity. It can be explained in the context of the two major factors. Firstly, the concepts of the party structure and operation have evolved in India during the period of the independence struggle. While fighting against the British imperialism, the parties were naturally more struggle-oriented than power-oriented. The national struggle required on the one side high centralization of direction and on the other side the strategy formation on the national scale. Hence the independence struggle precluded traditions of both decentralized decision-making and regional leadership. Thus the political traditions of the independence struggle strongly favoured the centralized parties.⁷⁰ Secondly, the national leaders of the independence movement had acquired immense charisma and mass-appeal. The sheer respect and humility precluded any idea of challenging them. The national leadership of all the parties have been drawn from this leadership pool, possessing legendary halo, record of sacrifice and popular identification with the liberation struggle. Such a post-independence hangover of the pre-independence political traditions and leadership fostered the growth of the unitary parties in the federal India.

⁷⁰ Santhanam : *op. cit.* (at fn. 28), pp. 61, 64.

Myron Weiner feels that such artificially strict discipline and the failure to recognize the reality of regional politics have been the chief cause of the ineffectiveness of the opposition parties as well as of the consequent growth of the multiparty system.⁷¹ Santhanam has observed that even the Praja Socialist Party and the Communist Party tried to impose stiflingly detailed discipline on the state ministries, when they assumed power for brief periods.⁷² Obviously such a type of direction from central leadership of parties to the state ministries is inconsistent with the true spirit of state autonomy.

Predominance of the Congress: The second feature of the Indian political scene had been predominance of the Congress party. The partition removed the Muslim League, that could have been a powerful counter-balancing force to the Congress. The removal of the League from the Indian political arena, the immense popularity of Jawaharlal Nehru and the prestige of the Congress as the party that led India to Independence—all these resulted into the almost monopolistic domination of the Congress party. In all the three General Elections (1952, 1957, 1962), it secured overwhelming majorities in the Union Parliament—always more than seventy-five per cent seats. Moreover, it continuously enjoyed power in all the states of the Indian federation, except in case of Kerala. In Kerala, there was the solitary interlude of two years (1957-1959) when the Congress lost power to the Communist Party. Further, the Congress was forced to support a minority government of the Praja Socialist Party for one year (1954-1955) in Kerala. Moreover, it was forced to share coalition-government twice—with the Praja Socialist Party in Kerala (1960-62) and with the Ganatantra Parishad in Orissa (1958-60).⁷³

⁷¹ Weiner : *Party Politics in India* (Princeton : Princeton University Press, 1957), pp. 342-346.

⁷² Santhanam : *op. cit.*, pp. 61-64.

⁷³ The Record of the Congress (See Raju : *op. cit.*, pp. 138-143):

<i>Election</i>	<i>Parliament</i>	<i>State Assemblies</i>
1952	362/483	2248/3279
1957	366/500	2130/3177
1962	361/494	1772/2855

Thus barring solitary exceptions, the Congress party has been ruling the Union government as well as all the State governments of the Indian federation. This one-party rule has superseded many features of the federal constitution.

Commenting on this unique phenomenon, Myron Weiner observes: "For the present, at least, India could be described as having a one-party democratic system based not on coercion found in one-party dictatorships, but on consent."⁷⁴

Predominance of Nehru and the Central Leadership: This monopolistic party-dominance led to the overwhelming predominance of the Central leadership over the State leadership.⁷⁵ The Central leadership of the Congress party exercised the final say in all matters of importance. The selection of candidates for the State assemblies, the formation of the State ministries after the elections, arbitration in case of disputes among local party groups, investigations into the allegations against the State-ministries, decisions as regard to resignation and reconstitution of the State ministries—all these were decided and controlled by the Central party office. Even in matters of policy-making, the decisions regarding vital state subjects were taken at the Central level. Thus the State governments were hardly consulted in case of the decisions regarding the co-operative farming, land-ceiling, food-trading etc.⁷⁶ N. V. Gadgil has made a detailed study of this centralizing impact of the Central leadership.⁷⁷ He maintains that the decisions of the All-India Congress Committee are binding on the parliamentary parties at the Union and State levels as well as on the State Congress organizations. Thus, "the effect of the Congress organization on the Union-State relations was to emphasize the strength of the Central government and the relative subordination of the State government."

⁷⁴ Weiner: *op. cit.*, p. 287.

⁷⁵ Palmer: *Indian Political System* (Boston: Houghton Mifflin, 1961), p.127.

⁷⁶ For details of these party and policy centralization, see Santhanam: *op. cit.*, pp. 61-64.

⁷⁷ Gadgil: "The Government and Party", *The Indian Journal of Public Administration*, Vol III, No. 4 (Oct.-Dec., 1957), pp. 347-356.

Absence of Concern: In face of the virtual supersession of federalism, the absence of concern or protest has been a disturbing feature. There was actually no public debate about federalism. Federalism was almost forgotten. The only articulate expression about federalism was against it. The Jana Sangh has been opposed to the idea of federalism. In every election manifesto it reiterated its opposition to federalism and advocacy of the Unitary form of government. It maintained that the federal constitution was "exotic and does not symbolize unified nationhood" and therefore it pledged to "amend the Constitution and declare India a Unitary State".⁷⁸ Except this solitary vocal opposition to federalism, there was no debate regarding dangers to or the prospects of federalism in India.

The over-all impact of the Indian party-system has been the virtual supersession of federalism. The co-existence between the federal polity and the unitary party system has been proving damaging to the former.

V. Emerging Counter-balance

Winds of Change: This monotonous picture of the continuous supersession of federalism and the unquestioned acquiescence in it has been changing somewhat recently. Since 1956, there has been growing awareness as well as opposition to the trends, dangerous to federalism. In a way, 1956 marks a watershed in the evolution of the Indian politics. The gradual decline of the Congress strength and discipline, the growth of effective challenge to the national leadership, the emergence of the linguistic regionalism and its impact on the national politics, the growth of the regional or state leadership capable of challenging or ignoring the national leadership—all these can be traced to the year of 1956. It is too early to say whether this may constitute a reversal of the trends, outlined earlier. Further it is also true that the political forces and traditions, leading to the unitary polity, are even now dominant. However,

⁷⁸ Poplai: *1962 General Elections in India* (New Delhi: Allied Publishers, 1962), pp. 56, 134.

one thing can be asserted without the fear of contradiction; the spell of silence and acquiescence has been broken and the issues have been joined. The days of unconcern over the fate of federalism are over; federalism has been increasingly figuring in the national debate. Even if the forces, inimical to federalism, are still strong; the effective counter-balance is fast emerging.

Articulate Protests : The year of 1956 saw the beginning of the articulate protest against the increasing erosion of federalism. Rajgopalachari, the first Governor-General of India and the highly respected statesman, was the most articulate crusader against the growing dangers to federalism. He wrote voluminously on the subject and almost carried on a pamphlet warfare against these trends. The typical passage gives some idea of his articulate crusades: "The States are being reduced pretty rapidly to the status of grant receiving corporations. This may appeal to some who are centrally-minded, but it would be a house built on sand. It can not last.... We must accept the inevitability of real federal crystallization as distinguished from monolithic patriotism.... The federal form of national unity should be recognized as inevitable for stability."⁷⁹ Another leading member of the Congress party K. Santhanam became increasingly disturbed at these trends. He had been an active member of the Constituent Assembly, a keen student of the Union-State relations and the Chairman of the Second Finance Commission. He got perturbed by "the recent trends towards operating the Indian Constitution, as if it were unitary while preserving the federal formalities."⁸⁰ He maintained: "The first thing which, in my view, deserves to be conserved with the greatest care is the Constitution.... I am convinced that, unless the state autonomy is restored in full, the development of totalitarian tendencies will be irresistible."⁸¹ As time went by,

⁷⁹ Rajagopalachari : *Satyam Eva Jayate* (Madras; Bharathan Publications, 1961), Vol. 1, pp. 61-62.

⁸⁰ Santhanam : *op. cit.* (at fn. 62), p. 15.

⁸¹ *Ibid.*, p. 10.

more and more public persons joined the crusade. It soon ceased to be individual protests and came to acquire the stature of a powerful stream of public opinion.

Linguistic Regionalism : The reorganization of States on the linguistic basis has generated three major impacts. Firstly, the struggle for the formation of the states, based on linguistic and cultural homogeneity, was fought against the reluctant national leadership. Though committed to the principle of such re-organization since 1920, the national leadership was reluctant to undertake such a task. The growth of powerful regional demands, the increasing pressures by opposition parties joining hands with regional sentiments, and in some cases the crusade led by regional Congress leaders or organization acting against the party discipline—all these forced the issue. The formation of Andhra in 1953 was the first major concession. The second stage of the concession was the appointment of the States Re-organization Commission in 1956 and the subsequent creation of the linguistic states all over India with only exception of the Bilingual Bombay. The third stage was the prolonged struggle by the people of Gujarat and Maharashtra for the creation of their own linguistic states by breaking up the Bilingual Bombay. This break-up was conceded in May 1960. Thus the struggle for the formation of linguistic states, in all its three stages, demonstrated triumph of linguistic or regional patriotism against the Central Congress leadership. It seriously weakened both the strength as well as discipline of the Congress.⁸²

Secondly, the linguistic states movement created the traditions of regional struggles and resulted in the growth of regional leadership. The mass frenzy, the civil disobedience movements carried out in the cities and villages, the emergence of songs and stories embodying regional patriotism—all these were reminiscent of the national independence movement. What the national struggles did for the generation of the national patriotism was done for the regional patriotism by the struggle for

⁸² For the details of the struggle and creation of the linguistic states see—Bondurant : *op. cit.*, pp. 21-55.

linguistic states. One event highlights the tempo of the movement. In the Congress stronghold of Gujarat, Indulal Yagnik (leader of the Mahagujarat movement) could hold a parallel meeting against Jawaharlal Nehru and draw the five-times larger audience. The event was unique and at the same time typical. It demonstrated the growing challenge of regional leaders to national leaders as well as of regionalism to nationalism.

Thirdly, the consequences of the States Re-organization has strengthened federalism, "The linguistic character of the reorganized states may strengthen the position of the States. The homogeneous composition of the States will result in greater unity within them and give them sub-national basis. The process of Union-State bargaining, which was absent in the formation of the Union, will assume increasing dimensions with the organization of these states."⁸³ The linguistic states gave real content to the federal form. "The formation of linguistic states has brought about a strong emotional attachment of the people to the states and has become the real federal force. It neutralizes to some extent the centralizing influence of other factors."⁸⁴ Thus the linguistic states have strengthened federalism both in their process of creation as well as their impact on national politics.

Emerging State Leadership : An unconscious and unintended side-result of the States Re-organization has been the growth of powerful state leadership. The gradual passing away of the national leadership of the pre-independence era coupled with the growth of the regional leadership have tilted the balance somewhat in favour of federalism.

The emerging regional leadership is fast learning to respect and assert autonomy as well as independence. Kamraj Nadar in Madras, Yashwantrao Chavan in Maharashtra, Atulya Ghosh in Bengal, Bijoyanand Patnayak in Orissa—these are typical examples of emerging regional bosses. Their power is derived

⁸³ Raju : *op. cit.*, p. 58.

⁸⁴ Santhanam : *op. cit.* (at fn. 28), p. 68.

from their hold over regional politics rather than from their national appeal. Thus Philips Talbot observed about Kamraj Nadar's position in Madras: "The Congress is Nadar's party and his vehicle to power, but it is locally-based power that leaves him relatively untroubled by any frowns that may come from Prime Minister Nehru and the party's high command."⁸⁵ Nehru's failure to keep Shri Jivraj Mehta as the Chief Minister of Gujarat in spite of his keen desire, indicates the changing balance between the national and regional leaderships. In the choice of the successor of Jawaharlal Nehru also, the cliques and "syndicate" of the regional leaders had played a major part. In 1965, the advise of the Prime Minister Shastri to introduce food-rationing was rejected by fourteen out of the fifteen states.

The impact of these emerging regional elites have been beautifully summarized by Sisir Gupta: "There are now regional elites coming up and, at the State's level, competing elites are functioning on the basis of caste or regional demands to press forth their demands on a differentiated basis.... At any rate, political power is likely to be largely vested in the hands of State leaders rather than in the hands of so-called national leaders."⁸⁶

Federal Impact on Party-structure: Federal polity, in the long run always tends to decentralize party-structure. "The basic political fact of federalism is that it creates separate, self-sustaining centres of power, privilege and profit which may be sought and defended as desirable in themselves.... In federal system decentralization and lack of cohesion in the party system are based on the structural facts of federalism."⁸⁷ In India also this federal structure has created many independent and self-sustaining centres of power and privilege, and this has gradually led to the loosening of the strict party discipline.

⁸⁵ Quoted by Harrison: *op. cit.*, p. 288.

⁸⁶ Sisir Gupta: "Competing Elites", *Seminar*, No. 51 (Nov. 1963), pp. 42-43.

⁸⁷ David Truman in MacMahon (ed.): *Federalism: Mature and Emergent*. (N. Y.: Russell & Russell, 1962), pp. 123, 133.

Often complaints and exasperations have been heard about this decline of party discipline. However, it is not clearly realized that such a decentralized and regionally oriented party operation is the inevitable corollary of the federal polity.

The enforced centralization of the Congress party has been sketched above. The very fact that a regional leader can hold independent power position, irrespective of favour or frown of the national leadership, encourages this decentralizing trends. Whenever the parties have tried to enforce artificial disciplines, it has led to splits in the parties.

The defection of Prakasam from the Andhra Unit and Thanu Pattam Pillai from the Kerala unit of the Praja Socialist party are examples of such splits.⁸⁸ Thus the Secretary of the party N. G. Goray observed: "Resistance to discipline has adversely affected the organizational ties between the Centre and the State units. In many states...the parliamentary section instead of working as a limb of the party is working as if it was an independent organization."⁸⁹ The Communist party also underwent the decentralization process under the impact of the federal polity. In 1958, the Communist party amended the party constitution to give more power to the State units. The nature of the amended constitution was characterized thus: "The over-all impression created by the Constitution is one of partial decentralization—indeed, the creation of a rudimentary federalism—in the party."⁹⁰ Harrison has made a very detailed study of the regional politics and its impact on the structure of the Communist party.⁹¹ Overstreet and Windmiller also confirm this federal-like structure of the Communist party; in their view it is "not a single monolithic autocracy but rather a cluster of autocracies, functional and regional."⁹²

⁸⁸ Weiner: *op. cit.*, pp. 38, 92, 94.

⁸⁹ *Ibid.*, p. 39.

⁹⁰ Park and Tinker (eds.): *op. cit.*, p. 247.

⁹¹ Harrison: *op. cit.*, pp. 246-248, 257.

⁹² Overstreet and Windmiller: *op. cit.*, p. 458.

The growing decentralization or federalization of party structure can be proved in case of almost all parties. It is a universal and growing phenomenon.

Growing Commitment : The period since 1956 has also witnessed a growing commitment to federalism by various political parties and groups.

The emergence of the Swatantra party is the most significant event in this regard. It is a party firmly committed to fight statism as well as centrism. Rajagopalachari has observed as early as 1957 : "It is for the parties opposed to the Congress in all various states to unite and form a state front relegating all other issues to the background and keeping only the autonomy of the state as the central core of its ideology."⁹³ Such a grand alliance of all the opposition on the issue of the State rights could not materialize. However, when the Swatantra party was born in 1959 under inspiration and guidance of Rajaji it embodied its leader's crusading zeal in defense of federalism. The manifesto of the Swatantra party said that it will "restore to the states the constitutional powers, functions and jurisdictions given to them by the Constitution."⁹⁴ Explaining the mission of the party, Rajagopalachari said : "In this vast area where customs and tenures and cultures have grown in variety, and continued to stay for centuries, Uniformity is stupidity as well as tyranny.... The Battle of Swatantra in India is both against Centralization and against Statism."⁹⁵

The Communist party also committed itself increasingly to the defense of federalism. The two factors contributed to this Communist zeal for federalism. Firstly, the Communist party gained immense gains in the 1956 elections in the areas where it aligned with the forces of regional patriotism. Such successes on the strength of regional forces emboldened it even to revive in modified form its earlier theory of multi-national

⁹³ Rajagopalachari : *op. cit.*, Vol 1, p. 105.

⁹⁴ Poplai : *op. cit.*, p. 163.

⁹⁵ Rajagopalachari : *op. cit.*, Vol. 2, pp. 739-740.

India. Any way the sheer calculation of electoral strategy drew it nearer to the demands of regional autonomy.⁹⁶ Secondly, its ouster from the Kerala government in 1959 brought to it a bitter realization of the dangerous power wielded by the Central government. Hence the Communist party made a firm and detailed commitment to federalism and state autonomy in its 1962 election manifesto. It advocated for the abolition of the Emergency Powers of the President, the direct election of the state governor, and the revision of the Seventh schedule to enlarge the powers of the States and to abridge those of the Central government. It declared: "The Constituent states of the Indian Union are denied power, resources and authority which they should have under a federal set-up . . . The Communist party firmly stands for wider power and authority . . . being given to the state of India."⁹⁷

The growth of the Dravid Munnetra Kazhgam in Madras demanding the creation of Dravidistan and the secession from the Indian Union is another noteworthy phenomenon. Though none takes its secessionist slogans seriously, it is in effect a party fighting for state autonomy.⁹⁸

Thus the commitment to federalism is growing rapidly. In fact most of the parties now recognize and respect the strength of regionalism. If some parties have openly committed to federalism; all parties have compromised with it.

VI. Pressures and Prospects

Pressures—Contradictory and Counterveiling: It is evident from the above survey that Indian polity to-day stands at cross-roads. It is subjected to the pressures that are contradictory as well as counterveiling. In a sense the struggle is on between the forces of unity and the forces of diversity. It is difficult to say at present the outcome of this struggle. However, it is submitted here that these counterveiling forces will, in all

⁹⁶ Overstreet and Windmiller: *op. cit.*, pp. 482-506.

⁹⁷ Poplai: *op. cit.*, pp. 107, 117-118.

⁹⁸ See *Seminar*, No. 34 (June, 1962), pp. 40-42.

probability, result in a creation of federal balance. None of the two forces is capable of subjugating completely the opposite one. This is a classic situation of federal balance, where the forces of unity and diversity are strong enough to defend themselves, but at the same time not strong enough to conquer. In such a balance lies the hope of federalism.

Forces for Unity : The desire of national unity is very strong. Since the Vedic times, the concept of the all-India unity has exerted a very powerful influence on popular and political imagination of India. This traditional urge for unity, the common cultural heritage, the memories of the independence struggle commonly fought, the impact of the Indian Renaissance movement, the political unity of more than hundred years under the British rule—all these constitute a base for the very strong urge for national unity. The peculiar constitution, the need of rapid economic development, the need of defense against the increasing Communist threat in the region, the considerations for foreign prestige emerging from its big size—these are modern forces that are strengthening the already existing basic urge for unity. In light of these forces, there are no prospects of complete disintegration of the national unity.

Forces for Diversity : However, the pull is not only in one direction. Opposed to these forces bringing about unity, there are also forces working for diversity. Powerful regionalism, the regional patriotism generated by the linguistic states, many centres of power and patronage existing in the federal polity, the impending break-up of the one-party domination, the consequent prospects of different parties ruling the Union and the state governments—all these contribute to robust regional autonomy.

Prospects of Federal Balance : Thus there are very good prospects for the emergence of federal balance. Though such a balance was somewhat absent in the early years of Indian federalism, it is at present fast emerging.

The two major opposition parties—the Swatantra party on the right and the Communist party on the left—have openly and firmly committed to federalism. The centrist Congress party has lost both the capacity and inclination for a unitary zeal in face of emerging realities of regional politics. Thus there seems to be a powerful consensus in favour of federalism. In fact any party, that may capture or come in vicinity of capturing power, will develop a stake in state-autonomy. It has happened in case of the Praja Socialist party and the Communist party. In light of the fact that no party can hope to capture power both at the Union and the State governments, it is likely to happen to any party who develops the prospects of coming to power.

Moreover, the geographical concentration of linguistic groups is another powerful federal factor. Wherever the diversity of languages has been distributed into compact and uni-lingual geographical regions, federal sentiment has always remained strong. Even with the quasi-federal constitution, the strong regional sentiment exists in the Canadian federalism. The diversity of languages is not a powerful force, when it is scattered all over; but it is a formidable force, when it is geographically localized. In India, the diversity of languages has already proved to be a barrier to detailed party discipline. The national leaders are unable to judge political situation, relative merits of candidates, trends of popular opinions in face of their ignorance of languages. Thus linguistic barriers to political assessment and party discipline affords a vast amount of immunity to regional leaders and regional politics.

Balance between Regionalism and Nationalism : Thus on one hand, the forces for unity create nationalism; and on the other hand, the forces of diversity, regionalism. Regionalism have never been a barrier to national integration. The strength of the Indian nationalism has always been its federal genius of integrating and accommodating regional and cultural autonomies. In view of the strength and stability of these two counter-balancing forces of nationalism and regionalism, only federalism

seems to be possible and desirable solution. Any unitary zeal will end in the destruction of the national unity.

The most notable modern historian K. M. Panikkar elucidates this federal inevitability in the Indian context: "The great regions in India, with their developed languages, with their historic cultures, and continuous traditions are essential parts of the conception of India. No one can conceive of India except in terms of its great regions... [Regionalism] is not a source of weakness, but of national strength... Rightly considered, it will be seen that India is no mere political federation; it is also a federation of cultures involving different languages also." In light of this analysis, he cannot foresee any basis for Indian nationalism other than federalism: "That is the type of integration that India has evolved and to attempt to force any other on her would go against the principles of India's historical evolution."¹⁰⁰

¹⁰⁰ Panikkar: *The Foundations of New India* (London; Allen and Unwin, 1963), pp. 226-227.

STRUGGLE IN A CONGRESS SESSION : IDEOLOGICAL AND PROCEDURAL

PRAVIN N. SHETH

*Lecturer in Political Science
University School of Social Sciences
Gujarat University, Ahmedabad-9*

Conferences of political parties often provide an opportunity of interesting study in styles and techniques of their ideological conflict. Intra-group relations at such conferences or sessions get crystallised on patterns of accommodation or split. But such ideological struggles are sometimes fought with tactical methods instead of polemical verbiages. Surat Session of A.I.C.C. held in 1907, provides a case study of how a great ideological issue was fought out on procedural front.

On the eve of this century, the Indian National Congress was facing an internal policy crisis of great dimension. Policy differences about the content of freedom, and method to achieve it were fast getting crystallised into two groups—Moderates and Extremists.

Modest in their demand, the former, in spite of the imperialist posture adopted by Lord Curzon and Lord Minto, believed in the British sense of justice and fair play. They did not believe in agitation as a method to snatch political concessions from the Government, and carried on their work by means of public debates, propaganda, petitions, apologetic deputations and, only lastly, by Coyn demonstrations. The Extremists regarded this as policy of petitions, prayers and political mendicancy. They wanted the Congress Party to adopt policy of *Swadeshi*, national education and boycott of foreign goods as well as government services, honours and titles. Thus the issues were

joined by those who believed in self-reliance and those who depended on good faith of the colonial power. While "the Moderates would meet in elites' club" at an urban centre, "the Extremists would start lathi clubs and *akharas* in the rural area". The former "wanted to improve the existing constitution; the latter would reconstruct it. If one would work with bureaucracy, the other would necessarily fight it." For this moderate "Gokhale would look to the classes and intelligentsia, (Extremist) Tilak, to the masses and millions. Gokhale's arena was the Council Chamber; Tilak's forum was the village mandap."¹ Dr. Sitaramayya in his monumental work on the Congress describes "Gokhale as one on level with his age", while "the other (Tilak) was in advance of his times."²

At the Calcutta Congress Session of 1905, the Extremists even got the twin policy of political boycott and economic policy sanctioned and the next year session of 1906 became a landmark in the history of national movement for passing the ideal of *Swaraj* under the Presidentship of Dadabhai Naoroji. But the Moderates' acceptance of such policy was only tactical. For the way Dadabhai was called from England at the age of 82 to preside over the session mainly to prevent Tilak from becoming its President³ had already created a deep fissure between the two wings of the party. The mildly worded resolutions on *Swadeshi*, etc. were considered as going too far by the Moderates and they wished to get them modified in a smooth way by the selection of Surat (controlled by moderate City Congress Committee) as the venue of the next session. The Extremists were quick to grasp the implications of the choice, and evolved their own strategy to fight any attempt at the revision of the policy.

¹ Sitaramayya, Pattabhi : *History of Indian National Congress*, pp. 99-100.

² However, as some Communist thinkers do, it would be erroneous to call the Extremists to be progressive in modern political terms, as they invoked Vedic Culture and principles of religious nationalism to resurrect nationalism.

³ Athavle : *Life of Lokmanya Tilak*, p. 151.

In the issue of the 22nd December 1907 of *Bande Mataram*, Sri Aurbindo Ghosh had envisioned that the "Surat Session should provide an opportunity necessary to give a refreshing and triumphant impulse which will invigorate and activise the Gujarat Nationalism and shape it into an organised force."⁴

The A.I.C.C. session of 1907 held at Surat thus in all probability could become a watershed demarcating the Indian national stream into two directions—different, if not opposite altogether. But instead of becoming a forum of expression of great thought-conflict and freedom perceptions of the pro-reform and pro-Swaraj wings of the Congress, the session was reduced to a campaign of procedure and propaganda. This brief paper attempts to bring out this internal procedural politics of pressure and manipulation with the personalities involved.

The Extremist took an initiative by sounding the Moderates that a more vigorous resolution on *Swaraj* and *Swadeshi* be moved in the session, to which the latter remained cool. As the procedure necessary for moving a resolution depended much on the President to be elected in this session, the Extremist group now concentrated on the strategy of electing the President of their own choice. The Reception Committee, mainly composed of the Moderate elements at this time, had decided to suggest the name of Dr. Ras Bihari Ghosh who had generally adopted a moderate stance. To counteract such a possibility, the Extremist nationalists began to carry on a pre-session campaign against his candidature. Balaji Tekri, in the heart of the city, became the popular venue of such campaign where Kharpade, the lieutenant of Tilak held regular meetings. The Moderates resorted to defence mechanism by holding the parallel propaganda meetings at the Furja near the Hope Bridge. A series of such meetings had gone a long way in igniting the political consciousness of the people of the city and it oriented them towards 'ideological' politics on the broad spectrum of nationalism. On the eve of the session when Lala Lajpatrai, the Extremist

⁴ Subsequently reproduced in *Dakshina*, November, 1960.

nationalist leader returned to India after completing his term of deportation, Surat took pride in being the first in welcoming him on behalf of the nation. The city honoured the national leader with utmost joy and enthusiasm on an unprecedented scale. *Pratap*, a local evening daily, reports:⁵

"The same day, the reception procession organised to honour Dr. Ras Bihari Ghosh was conspicuous by the absence of enthusiastic mood expressed by the city towards Lalaji in the morning. These two scenes bring into sharp focus the mood of the people for it indicates the distance between the people favouring a radical national leader and the local Congress leaders promoting a Moderate for the Presidentship."

On 26th December, in the open session the name of Dr. Ghosh was proposed for this strategic office by Rao Bahadur Desai, the Chairman of the Reception Committee and seconded by Dr. Surendra Nath Banerjee. Instantaneously rowdism prevailed over the Mandap. Because of the disturbances on the preliminaries, the meeting was adjourned. On the second day, the repeat performance in the reconvened meeting would give credit neither to the Moderates nor to the Extremists. However, when Dr. Ghosh, after his 'formal election', occupied the chair of Presidentship, Tilak rose to move an amendment to Rao Bahadur's resolution, for which notice had been given the previous day. But leave was refused by the Chair. The intense differences expressed on the propriety and constitutionality of the preliminary procedure of the meeting resulted only in rowdism and disorder. A press-note published that evening by the Extremists, who described themselves as Nationalists, charged that (the leaders of the city as) the Reception Committee members, wanted "to trick Sri Tilak out of his right to move the amendment against Dr. Ghosh's Presidentship and to address the A.I.C.C. delegates". They also alleged that the local Moderate leaders "had distributed in the Pandal inflammatory pamphlets in Gujarati instigating the Gujarati people against them".

⁵Pathakji, J. C. : *Pratap* (Congress Number), 26-2-1936.

In the meeting held next day, the atmosphere was surcharged with commotion because of charges and countercharges in this matter, and a shoe was hurled at Tilak from some corner⁶ when he insisted on his right to address the delegates from the dias. In another press-note issued the next day, the pro-Tilak Nationalists charged the Reception Committee of manipulation by relieving the nationalist volunteers from their duty on the previous night and "hiring Musalman goondas". In such an atmosphere of lack of confidence, it was not possible for any body to control the situation. Through the battle of pamphlets and skillful use of the favourable response of the local masses, the Extremists commanded strength not commensurate with their numerical presence and developed a sort of crisis situation. "Chairs flew as missiles" and the riotous meeting therefore was adjourned *sine die* without deciding about the time of future meeting. The evacuated Pandal was occupied by the police waiting for this occasion.⁷

Thus at last the looming shadows of an inevitable split in the Congress fell over Surat session. As disclosed only recently, "Few know that Sri Aurbindo had played a leading part in persuading the Nationalist Extremists not to compromise with the Moderates and precipitate a split in the Congress."⁸

After the split, the Moderates held a separate Convention under police protection in the Congress Pandal and the Nationalists held another meeting in a different locality of the city. The Anglo-Indian press, which was eagerly waiting for such an eventuality characterised this as the proof that the Congress sessions now known for disturbances, disorder and indiscipline, reflected the inability of the Indians to govern themselves. But the Moderates' Convention replied them well

⁶ This fact challenges Navinson's account that it was hurled at Sri Phirozshaw Mehta and Dr. S. N. Banerjee (See *The New Spirit in India*, pp. 256-259).

⁷ *Source Material for A History of Freedom Movement* (Bombay State), Vol. II.

⁸ Sri Aurbindo: *Shri Aurbindo on Himself and the Mother*, p. 79.

by appointing a committee which for the first time drafted the constitution of this historic party. Dr. Jadunath Sarkar has described this session of the Congress as one of "the most historic ones", from the view point of consequences it produced. It provided for "the much needed surgery and shock treatment" to regenerate the idle Congress nursing sickly confidence in the good sense of the British rulers. Such treatment was to make it braced, invigorated and active. The pace and course of national movement and consequently the history of modern India now took a definite turn. The vested dominance of the party "eventually passed from the elite bourgeoisie to the new educated middle class" now fast emerging on the political scene. The radicals gave a 'leftist' turn to the style and content of the national movement; and the captivating dialogue between the Moderates and the Extremists which took place for weeks in the wake of this session, revitalised the political consciousness of the people. In its wake Kasanji Vakil, Dahyabhai Vakil, Kalyanji Mehta, Dr. M. K. Dikshit and other young workers established the radical Nationalist Association in Surat.

From this account, following conclusions can be drawn :

1. Both the wings of Congress had grasped the significance of the Surat Session. This is evidenced by the fact that both took care to make last stage preparation for meeting the challenge from the other side. The Reception Committee by its partisan attitude hastened the process of converting the differences into an open conflict.
2. The distance between the Moderate leaders and the pro-Extremist population of the city also might have given a momentum to the tempo of the situation. The Extremists skillfully availed themselves of the remarkable interest and involvement shown by the local mass in their cause.
3. The Extremist minority, although temporarily unsuccessful in capturing the organisation of the Congress,

succeeded in precipitating a participation crisis in the party. They had now begun to appeal to people over the head of the ruling group. The mass base was thus prepared by this minority group which eventually was to dominate the party on the eve of the coming War.

4. Thus though the nationalist politics and policy dialogue were shrouded by the politics of tension and procedure in the actual session, it gave it a purposeful direction by popularising the cause of *Swaraj*, Boycott, *Swadeshi* and National Education. The general impression about this session being a failure is wrong, as the gaining of edge of the procedural component of politics over its 'ideological' component was more apparent than real.

SYNOPSIS

This article is prepared on the basis of material mainly provided by the *Source Material for a History of Freedom Movement* (Bombay State), Vol. II, published recently by the Government of Bombay. It contains extracts from newspapers, pamphlets and leaflets, Memorandas, Government notes and other contemporary material.

It describes how in the Surat A.I.C.C. Session of 1907, the great policy crisis precipitated by the pro-reform Moderates and the small, but articulate Extremist minority was temporarily sidetracked by the politics of procedure and propaganda to which both the wings of Congress resorted.

It also refers in brief to the distance prevailing between the local masses and the leaders, the concealed role probably played by Sri Aurbindo, and the place of this session in the nationalist politics. However the politics of procedural technicality could not for long overshadow the politics of policy of Congress.

ભારતીય ઇતિહાસના કહેવાતા અધિકાર યુગો

લેખાંક ૨

ડૉ. ર. કે. ધાડેયા

ઇતિહાસ વિભાગ, સમાજવિદ્યા ભવન, ગુજરાત યુનિવર્સિટી
અમદાવાદ-૬

સાતવાહન યુગ

(આશરે ઈ. સ. પૂર્વે ૨૩૦થી લગભગ ઈ. સ. ૨૩૦)

પૂર્વપ્રસ્થ

ઉપલબ્ધ પુરાતાના આધારે એમ કહી શકાય કે દખ્ખણ અને દક્ષિણ ભારતમાં કદાચિત સૌથી પ્રથમ અને સૌથી પુરાણું સામ્રાજ્ય સાતવાહનોનું મણ્ડાય. દખ્ખણ અને દક્ષિણમાં સાંસ્કૃતિક એકતાની સાથે રાજકીય એકતાનો પાયો નાખનાર સાતવાહન સત્તા હતી. આ રીતે તેમને મૌર્યોના વારસદાર ગણવાનું ઉચિત લેખાય. મૌર્ય સામ્રાજ્યના અસ્ત બાદ ગુપ્તોના ઉદય સુધીના આશરે પાંચસો વર્ષના ગાળામાં ઉત્તરમાં અનેક રાજ્યવંશો સ્થપાયા અને લય પામ્યા; પરંતુ લગભગ આ જ સમય દરમિયાન દખ્ખણ ભારતમાં મુખ્ય સત્તા તરીકે સાતવાહનોએ શાસન ચલાવ્યું. ઉત્તર ભારતમાં શું, ક્યવ, ખેડિટ્ટ્યન મીક, શક-પદ્મલવ, કુશાણ, શક-ક્ષત્રપ, નામ-મારશિવ વગેરે રાજ્યવંશો આપ્યા અને ગયા ત્યારે સાતવાહનોએ ૪૫૦ વર્ષ ઉપરાંત દખ્ખણ ભારતમાં આધિપત્ય ભોગવીને તેના રાજકીય તથા સાંસ્કૃતિક ધકતરમાં નોંધપાત્ર ફિરસો આપ્યો. તેઓએ પોતાના અનુભાવી ધક્કવાકુ અને વાકાટકોને આ અમૂલ્ય વારસો આપ્યો. ચાલુક્યો, પદ્મલવો અને રાષ્ટ્રકૂટોના સમયમાં દખ્ખણ અને દક્ષિણ સાંસ્કૃતિક વિકાસનું જે સ્વર્ગ ખિન્દુ અનુભવ્યું તેનો પાયો સાતવાહનોને હસ્તે નખાયો હતો.

સાધનસામગ્રી—અવશેષીય

દખ્ખણમાં સાહ્યારસે વર્ષ ઉપરાંત મુખ્ય સત્તા તરીકે સ્થાન ભોગવનાર સાતવાહનો વિશે કમનસીબે જોઈએ તેટલી અને તેવી માહિતી મળતી નથી. લેખો, સિક્કાઓ, વગેરે પ્રમાણમાં ધણુ એમના છે અને તેમાંથી પણ પર્ચાઈત અહેવાલ મળતો નથી. સમકાલીન રાજ્યોના દસ્તાવેજોમાંથી પણ ખાસ હડીકત મળતી નથી. સાતવાહનોના ૩૦ રાજ્યોના^૧ શાસન પરત્વેના ફક્ત ૭ લેખો દખ્ખણના પૂર્વ ભાગમાંથી તથા ૧૯ લેખો દખ્ખણના પશ્ચિમ ભાગમાંથી^૨ મળ્યા છે. તેમાંના ધણુખરા ટૂંકા છે અને ખાસ કરીને રાજ્યોએ બીક વિકરોને

^૧ Pargitar, 'Dynasties of the Kali Age', pp. 20, 35, 36.

^૨ 'A Comprehensive History of India', Vol. II. pp. 291-97.

આપેલા હાનોનો જ તેઓ ઉલ્લેખ કરે છે, જાણે નાનાઘાટ અને નાસિકના લેખો માહિતીની દૃષ્ટિએ મહત્વના ગણાય. નર્મદા અને ગોદાવરી તથા ગોદાવરી અને કૃષ્ણા વચ્ચેના પ્રદેશોમાંથી સાતવાહનોના સિક્કાઓ ઠીક પ્રમાણમાં પ્રાપ્ત થયા છે, પરંતુ તેમાંના મોટા ભાગના અક્ષરો ભૂંસાયેલા છે અથવા તો તેઓમાંના ધણુખરા એકના એક રાગના છે. કનિંમહામ, ભગવાનલાલ ઇન્દ્રજી, એચ. આર. રેકોટ, એફ. ડબ્લ્યુ. થોમસ, રેપ્સન વગેરે પુરાતત્વવિદોએ આ સિક્કાઓને ઉકેલવાના પ્રશસ્ત પ્રયાસો કર્યા છે.^૭ તેમાં અપાયેલાં રાગઓનાં નામ, સમય વગેરે વિષે પણ વિદ્વાનો વચ્ચે ધણુ મતભેદ પ્રવર્તે છે. અશોકનો શિલાલેખ નં. ૧૩ આન્ધ્ર પ્રદેશના ભૌગોલિક સ્થાનના નિર્દેશ સિવાય આન્ધ્ર વિષે વિશેષ પ્રકાશ પાડતો નથી. ઈ. સ. પૂર્વે ૨૦૦ની આસપાસનો મનાતો કૃષ્ણા નદીના પ્રદેશનો બહી પ્રાણુનો લેખ કુબેરક નામનો રાગ ભૌર્યોથી સ્વતંત્ર હતો તેવી અમત્યની નોંધ કરે છે.^૮ આનો અર્થ એમ થઈ શકે કે અશોકના અવસાન પછી ટૂંક સમયમાં જ ઇષ્ખણુમાંથી ભૌર્ય સત્તાનો અંત આવ્યો હશે અને સાતવાહનોએ સ્વતંત્ર રાજ્યનો વિસ્તાર કર્યો હશે. અભિલેખો અને સિક્કાઓ ઉપરાંત અન્ય અવશેષીય સામગ્રી પણ પ્રમાણમાં ઓછી છે. પૈદાન, માસ્કી, કાન્ડાપુર વગેરે સ્થળોએ થયેલાં ખોદકામમાંથી થોડી વસ્તુઓ, અદ્દપ અક્ષકારો વગેરે મળેલ છે, પરંતુ સાતવાહન સમય પર વધારે આધારભૂત પ્રકાશ પાડી શકાય તેવી સામગ્રી ખાસ પ્રાપ્ત થયેલી નથી. વિદ્વાનો માને છે કે હાલના મહારાષ્ટ્ર રાજ્યના ઔરંગાબાદ અને નાસિક વિસ્તારમાં, હાલના આન્ધ્ર રાજ્યના નિઝામાબાદ તથા હૈદરાબાદ વિસ્તારમાં અને હાલના મધ્ય પ્રદેશના ઉજ્જૈન તથા બોપાળ પ્રદેશમાં વિશેષ શોધખોળ થાય તો સાતવાહન યુગ વિષે વધારે ઉપયોગી માહિતી પ્રાપ્ત થઈ શકે.

સાધનસામગ્રી — સાહિત્યિક

સાતવાહનોને લગતી સાહિત્યિક સાધનસામગ્રીમાં પુરાણોનું સ્થાન ખૂબ અમત્યનું છે. જોકે પુરાણોએ આપેલાં ૩૦ રાગઓનાં નામ, ક્રમ, તેમના શાસનકાળનાં વર્ષો, તેમનો રાજ્યવિસ્તાર અને તેમને લગતી અન્ય વિગતો શુદ્ધ નથી; જાણે તેમાંનાં ધણુખરાં નામ, લેખો, સિક્કાઓ અને અન્ય સાહિત્યે આપેલાં નામો સાથે મળતાં આવે છે તે નોંધપાત્ર ગણાય. બીજો મહત્વનો તફાવત એ છે કે પુરાણોમાં સાતવાહન રાગઓને આન્ધ્ર રાગઓ કહ્યા છે, જ્યારે લેખો અને સિક્કાઓમાં તેમનો સાતવાહન તરીકે ઉલ્લેખ થયેલો છે. આ તફાવતનો મેળ વિદ્વાનોએ એ રીતે બેસાડવાનો પ્રયત્ન કર્યો છે કે 'આન્ધ્ર' ભૌગોલિક નામ^૯ હોઈ શકે, જ્યારે 'સાતવાહન' કૌટુંબિક નામ ગણી શકાય. ટોલેમી કૃત ભૂગોળ^૧, પ્લાઈની લિખિત પ્રવાસગ્રંથ^૨ વગેરેમાં પણ 'આન્ધ્રો'નો નિર્દેશ થયેલો છે. સાતવાહન રાગના આશ્રયે ગુણાદય નામના લેખકે 'બૃહત્કથા' નામે ગ્રંથ લખ્યો હોવાનું મનાય છે. કમનસીબે આ પુસ્તક આજે મૂળ સ્વરૂપમાં મળતું નથી, નહિતર સાતવાહનો પરત્વે પ્રશસ્ત

^૭ Rapson, 'Coins of the Andhra Dynasty'.

^૮ 'Archaeological Survey of India' (1923-24), p. 88.

^૯ Ashoka's Rock Edict No. 13.

^૧ H. Raychaudhari, 'Political History of India', pp. 497-98.

^૨ 'The Age of Imperial Unity', pp. 209-210.

પ્રકાર પડત; પણ આ મંથના અમુક ભાગોના ઉતારા બુદ્ધસ્વામી દ્વારા 'બુદ્ધકથા-
'બોક્ષ'માં, જેને રચિત 'બુદ્ધકથામંજરી' તથા સોમદેવ લિખિત 'કથાસરિત્સાગર'માં
મળે છે. તેમની કેટલીક વીમતો અભિલેખો અને સિક્કાઓ સાથે સરખાવતાં વાસ્તવિક લાગી છે.
'લીલાવર્ધ' નામના પ્રાકૃત ગ્રંથમાં પૌરાણિક યાદી પ્રમાણે રાજા નં. ૧૭(હાલ)ની લશ્કરી
ઠારકિર્દીનું વિવરણ છે, છતાં રાજાઓ નં. ૬થી ૧૬ તથા શાસકો નં. ૧૮થી ૨૨ વિશે
ખાસ કોઈ માહિતી ઉપલબ્ધ નથી.

સાતવાહનનો અર્થ

તામ્રપત્રોમાં 'સાતવાહન', 'સાત', 'સાતકણ્વી' તથા 'સાતકણ્વી' નામ મળે છે,
ન્યારે પુરાણોમાં 'આન્ધ', 'આન્ધક', 'આંધ્ર ભૂત્ય', 'આંધ્ર જાતીય' વગેરે નામો વપરાયાં છે.
સાતવાહનોના ઈ. સ. પૂર્વે બીજી સદી પહેલાંના રાજાઓના કોઈ સિક્કાઓ પ્રાપ્ત થયા નથી.
આ ઉપરથી ઇતિહાસવિદોએ અનુમાન કર્યું છે કે આન્ધ્રો પ્રથમ મૌર્ય અથવા શુંગ સત્તાના
સેવકો કે સામંતો હશે અને મૌર્ય સામ્રાજ્યના પતન બાદ સ્વતંત્ર સત્તા તરીકે તેમનો ઉદય
થયો હશે.^૯ વળી આન્ધ્ર જાતિ કે સ્થળનું નામ, સાતવાહન કુળનું નામ તથા સાતકણ્વી
અટક હોવાનો સંભવ રજૂ કરવામાં આવ્યો છે.^{૧૦} સાતવાહન એ સપ્તવાહનનું પ્રાકૃત રૂપ
જણાય છે. સાતવાહન એટલે સાત અથોના વાહનવાળા સૂર્ય આ અર્થ સ્વીકારીએ તો
ક્ષત્રવાહનો સૂર્યવંશી હરે. સોમદેવે સાતવાહનનો લગભગ આજ અર્થ કરેલો છે.^{૧૧}
જિનપ્રભસૂરી આ અભિપ્રાયને ટેકા આપે છે. વિષ્ણુનાં હજાર નામોમાંનું એક નામ 'સપ્તવાહન'
છે માટે આન્ધ્રોએ પોતાને વિષ્ણુના વંશજ ઠરાવવા સાતવાહન નામ રાખ્યું હોય તેવો પણ
એક મત છે.^{૧૨} આન્ધ્રમુલક, અન્ધક, અન્ધક, આન્ધ્ર વગેરે શબ્દો સ્થળ અથવા જાતિસૂચક
માનવામાં આવે છે.

મૂળ રહેઠાણ

આન્ધ્ર(સાતવાહન)ના મૂળ રહેઠાણ વિશે બે પ્રકારનાં મતો છે: (૧) દક્ષિણનો
પૂર્વ ભાગ અને (૨) દક્ષિણનો પશ્ચિમ ભાગ. શ્રી. સિમથ, શ્રી. રેપ્સન, શ્રી. ભાંડારકર વગેરે
વિદ્વાનો તેમને પૂર્વ પ્રદેશ એટલે કે હાલના આન્ધ્ર પ્રદેશના વતની હોવાનું માને છે.^{૧૩} સિમથ
સાતવાહનોની રાજધાની કાકુલમને અને ભાંડારકર ધનકટકને ગણે છે. આ માન્યતાની સામે
ડૉ. સુકથાનકરે પ્રથમ અવાજ ઉઠાવ્યો.^{૧૪} અભિલેખો, સિક્કાઓ, સાહિત્ય વગેરે વિષયક પુરાવા
પણ આન્ધ્રોનું મૂળ વતન પશ્ચિમ પ્રદેશ હોવાનો નિર્દેશ કરે છે. મોટા ભાગના લેખો (૨૬માંથી ૧૬)
તથા સિક્કાઓ પણ પશ્ચિમ વિભાગમાંથી મળેલા છે. ઈ. સ.ના પહેલા સૈદ્ધા પછીના આન્ધ્ર
રાજાઓના સિક્કાઓ મોટે ભાગે પૂર્વ પ્રદેશમાંથી મળેલા છે, ન્યારે તે પહેલાંના સમયના

^૯ 'A Comprehensive History of India', Vol. II, p. 306.

^{૧૦} 'Epigraphia Indica', Vol. XX, p. 75.

^{૧૧} Ibid.

^{૧૨} 'Kathāsarit Sāgar', Trans. p. 37.

^{૧૩} Ep. Ind. VIII, p. 44.

^{૧૪} Bombay Gazetteer 1(II), p. 173.

^{૧૫} Ep. Indica, Vol. XIV (1917).

સાતવાહન રાજ્યોના સિદ્ધાંતો ધણી ભાગે પશ્ચિમ વિભાગમાંથી પ્રાપ્ત થયેલા છે તે પણ સ્પષ્ટ કહેવાય. ધણીપસ આધુનિક વિદ્વાનો દ્વારા મહારાષ્ટ્ર રાજ્યના ઔરંગઝાદ મિર્જામાં આન્ધ્રોનું મૂળ વતન હોવાનો અભિપ્રાય કરાવે છે. તે જ પ્રદેશના પ્રતિષ્ઠાન (દાહનું પેકાન)ને તેમની રાજધાની માનવામાં આવે છે. પેકાનથી આશરે ૧૦૦ માઈલ દૂર આવેલા નાન્દ્યાલ- (પશ્ચિમ ધાટની ધાટી)ની ગુફામાં સાતવાહન વંશના સ્થાપક સિમ્હુ અને તેના અનુયાયી રાજા તથા તેના સંબંધીઓની આકૃતિઓ પણ છે.^{૧૫} વળી આન્ધ્રોના નાસિક, અમરાવતી, અજંટા વગેરેના લેખો^{૧૬} પણ તેમનું મૂળ વતન પશ્ચિમ બાજુ હોવાનું પુરસ્કાર કરે છે. ક્ષિત્રિયા રાજા ખારવેલે પોતાના દાથી ગુફાના શિલાલેખમાં મુશકનગર જીત્યાનો ઉલ્લેખ કરેલો છે.^{૧૭} મુશકનગર જેવું કોઈ નગર વિદ્વાનોની નજીમાં નથી; પરંતુ તેને બદલે અક્ષક- નગર વાંચવામાં આવે તો તે આંધ્રિય પશ્ચિમ બાજુનું નાણીતું નગર હતું, ખરેખર અમુક સાતવાહન રાજ્યોએ ધારણ કરેલ દક્ષિણપથપતિનો ખિતાબ પણ પહેલા સૈદા સુધી પશ્ચિમ ભાગને જ લાગુ પડતો હતો તેમ પેરિપ્લસનાં લખાણો^{૧૮} પરથી મલુમ પડે છે. જૈન સાહિત્ય પણ પ્રતિષ્ઠાપનને સાતવાહનોની રાજધાની માને છે.

જાતિ

આન્ધ્રોની જાતિ સંબંધમાં પણ વિદ્વાનોમાં એવો જ ઉગ્ર મતભેદ પ્રવર્તે છે. ડૉ. રાયચૌધરી તેમને બ્રાહ્મણ નામ જાતિના હોવાનું ધારે છે.^{૧૯} ગૌતમીપુત્ર સાતકર્ણી (રાજા નં. ૨૩)ની નાસિક પ્રશસ્તિમાં તેનો 'એક બ્રાહ્મણ' (અગ્રેડ બ્રાહ્મણ) તથા 'ખતીય-દપ-માન-મદન' (ક્ષત્રિયોના માન અને ગર્વને હણનાર) તરીકે ઉલ્લેખ થયેલો છે.^{૨૦} તે જ લેખમાં બ્રાહ્મણના રક્ષણહાર તરીકે પણ તેનો નિર્દેશ થયેલો છે. આને લીધે અમુક વિદ્વાનો સાતવાહનને ક્ષત્રિય માને છે, પરંતુ આ લેખમાંથી તે ક્ષત્રિય હોવાનું ક્ષિત થતું નથી. સાતકર્ણી^{૨૧} ૧ લા (રાજા નં. ૩)ની રાણી નાયનિકા કે નાગનિકાએ નાનાધાટની ગુફામાં કૌતરાવેલા લેખ પરથી એમ અનુમાન થાય છે કે સાતવાહનો બ્રાહ્મણ અને નામ જાતિના મિશ્રજૂરપ જાતિના હશે. 'નાયનિકા' નામ નામ જાતિ સાથે સંબંધિત હોવાનું માની શકાય. આન્ધ્રો લિપિનો સૌથી પુરાણો સાહિત્યિક ઉલ્લેખ ઐતરેય બ્રાહ્મણનો કહી શકાય. તેમાં આન્ધ્રોનું ત્રિશ્ચામિત્રના દેશવટો આપવામાં આવેલા પતિત પુત્રો તરીકે વિવરણ કરેલું છે.^{૨૨} પરંતુ તેમની જાતિ વિષે સ્પષ્ટ કંઈ નિર્દેશ કરવામાં આવેલો નથી. કૌટિલ્યના અર્થશાસ્ત્ર, મહાભારત, બૌદ્ધ જાતકકથાઓ વગેરે પુરાણો સાહિત્યમાં પણ આન્ધ્રોનો ઉલ્લેખ છે, પરંતુ આ ત્રણે તેમની જાતિ કે ઉદ્ભવ વિષે મૌન સેવે છે. વળી ઉપરોક્ત ગ્રંથોમાં ઉલ્લેખિત આન્ધ્રો તથા મૌર્ય સમય બાદના આન્ધ્રો વચ્ચે કોઈ સંબંધ હતો કે કેમ તે પણ અન્વેષણની બાબત

^{૧૫} 'A Survey of India' (1923-24), p. 88.

^{૧૬} Ibid.

^{૧૭} Ep. Ind. Vol. XX, pp. 79-87.

^{૧૮} 'Early History of India' (1924), Smith, p. 245.

^{૧૯} 'Political History of India', p. 413.

^{૨૦} Ep. Ind. XXII-32.

^{૨૧} 'A Comprehensive History of India', Vol. II, p. 300.

છે. એ રીતે આન્ધ્રોને આસિલોમિક તથા સિલ્હાઓના પુરાવાને આધારે પાટણ-નામ આસિલો મળ્યા અરવાને ન કહેવન.

મુખ્ય રાજ્યકર્તાઓ

પુરાણે રાજા સિમુક, સિશુક, સિંહુક કે રાજ શ્રીમુખને સાતવાહન વંશના સ્થાપક તરીકે વર્ણવે છે. તેમના સિવરણ પ્રમાણે સિમુકે એસા શુભ રાજ્ય સુશર્મનનો (ઈ. સ. પૂર્વે ૪૦થી પૂ. ૩૦) પદાભિષ કરીને આન્ધ્ર રાજ્યવંસની સ્થાપના કરી, પરંતુ સિમુકની પુનર્વત્ત અને સાતકર્ણી ૩ આની રાણી નામનિકાના નાનાઘાટ લેખનું વર્ણન તપાસતાં સિમુક ઈ. સ. પૂર્વે ત્રીજા સદ્દશમાં, એટલે કે અશોકના અવસાન પછી તરત થયો હોવાની પ્રતિતિ થાય છે. પરિણામે તે શુભના શાસન (ઈ. સ. પૂર્વે ૭૫થી ઈ. સ. પૂર્વે ૩૦) પહેલાં આશરે ૨૦૦ વર્ષ વહેલો થઈ ગયો હોવાનું સ્વીકારવું પડે. એ રીતે પુરાણોનું વિધાન યોગ્ય ઠરતું નથી. સંભવતઃ તે અશોકનો દખ્ખણ પ્રદેશનો સુયો હશે અને અશોકના અવસાન બાદ મૌર્ય સામ્રાજ્ય નિર્બળ બનતાં તેણે સ્વતંત્ર સાતવાહન રાજ્યની સ્થાપના કરી હશે. ૨૨ આ કાર્યમાં તેના ભોળે અને રથિકાએ (સામંતોએ) તેને સહાય કરી એટલે તેણે શાસક બનતાં તેમને મહારથીઓના પિતાબ આખા. ૨૩ પુરાણોના કથન પ્રમાણે તેણે ૨૩ વર્ષ શાસન કર્યું. બૌદ્ધ અને જૈન સાહિત્યના વર્ણન પ્રમાણે તેણે બૌદ્ધ અને જૈન મંદિરો બાંધ્યાં. ૨૪ પોતાના જીવનનાં પાછલાં વર્ષોમાં તેણે બૌદ્ધ ધર્મની વિશેષ તરફેણ કરતાં તેને પદભટ્ટ કરીને તેની હલ્લા કરવામાં આવી એવા પુરાણોના વિધાનને વાસ્તવિક ઠરાવવા માટે અન્ય પુરાવાની જરૂર રહે છે.

સિમુક પછી મોટીએ આવનાર તેના નાના ભાઈ કન્હે (સંસ્કૃત કૃષ્ણ) ૧૮ વર્ષ રાજ્ય કર્યું. નાસિકના તેના સમયના એક લેખના વર્ણન પ્રમાણે તેણે નાસિક સુધી પ્રેતાતો રાજ્યવિસ્તાર કર્યો. તેણે બૌદ્ધ સાધુઓના નેતૃત્વ તળે નાસિકનો વહીવટ અલાવવા મહાસાનતી નિયુક્તિ કર્યાં હિલેખ ખાસ નોંધપાત્ર ગણાય. નાસિક લેખના આ નિર્દેશ પરથી ઔરેના સમયનું આ વિસ્તાર પરતું બૌદ્ધોનું વર્ચસ્વ ચાલુ હોય તેવું ફલિત થાય છે. વળી સિમુકે પચાશ સાસનનાં પાછલાં વર્ષોમાં બૌદ્ધ ધર્મની વિશેષ તરફેણ કરી હતી તેવું પુરાણોનું વિધાન આ સંદર્ભમાં વિચારવા જેવું લાગે છે.

સાતકર્ણી ૧ લો કે, સાતકર્ણી ૧ લો સાતવાહન રાજ્યોમાં પછીથી સામાન્ય બનનાર 'સાતકર્ણી' તથા 'મી'નું ચિહ્ન બાંધ્યું કરનાર સૌમ્યમ રાજાની હતો. ૨૫ તેની મહારાણી નામનિકાના નાનાઘાટના લેખના ઉલ્લેખ પ્રમાણે તેણે સાતવાહન સત્તાને હિતરે પશ્ચિમ માળવા સુધી તથા દખ્ખણે હાલના મહારાષ્ટ્ર તથા આન્ધ્ર પ્રદેશના થણા લાગે સુધી વિસ્તાર કર્યો હતો. તેણે નાગ જાતિના અંગીય કુસના પ્રબળ મહારથી મંકયીરોની પુત્રી નામનિકા સાથે લગ્ન કરીને પોતપોતું સ્થાન રાજકીય રીતે થણું હદ બનાવ્યું. આન્ધ્રી તેને

૨૨ Ibid., p. 301.

૨૩ Nānāghāt Ins.

૨૪ 'Dynasties of the Kali Age', Pargitor, p.p. 38-71.

૨૫ Nānāghāt Ins.

નામ જાતિનો સાથ મળ્યો. પોતાની વિવિધ જિતોની માદમાં તેણે બે અશ્વમેધ યજ્ઞ (સમ્રાટ પદના સ્થાનક) તથા એક રાજસૂય યજ્ઞ કર્યાં. અશ્વમેધ યજ્ઞ કર્યાનો નિર્દેશ હજ્જપણ્ણમાં વેદિક ધર્મની પુનઃપ્રતિષ્ઠાનું સ્પષ્ટ કરે છે. તેણે પારણ્ય કરેલા દક્ષિણાપથપતિ, અપ્રતિકલતચક વગેરે પિતાઓ પણ્ય તેની મહત્તા દર્શાવે છે. પુરાણોના કથન પ્રમાણે વિવિધ યજ્ઞો પ્રસન્ને તેણે ૪૨૭૦૦ ગાય, ૧૦૦૦ અશ્વ, ૧૦ હાથીઓ, ૧૭ ચાંદીના ધડા તથા ૬૮૦૦૦ સિંહાઓ જ્ઞાનમાં આપ્યા.^{૨૧} આ આકિડાઓમાં થોડી અતિશયોક્તિ હશે તોપણ સાતકર્ણીની ઉદાર દાનવૃત્તિના તે સ્પષ્ટ છે. તે કલિંગના રાજા પારવેલનો સમકાલીન હોવા વિષે વિદ્વાનોમાં મતભેદ છે. મોટા ભાગના વિદ્વાનો તેને સિમુકનો પુત્ર માને છે. તેના સમયના બે સિંહાઓ મળ્યા છે. રેન્સનના મત પ્રમાણે તે સાતકર્ણી ૧ હાના છે.^{૨૭}

સાતકર્ણી ૧હાનું કદાચિત યુદ્ધમાં મૃત્યુ થયું ત્યારે તેના બે જીવિત પુત્રો વેદિશ્રી અને સતીશ્રી બાલક હોવાથી તેની રાણી નાયનિકાએ વહીવટ સંભાળી લીધી. પોતાના પિતા ત્રંકપીરોની સહાયથી રાજમાતા નાયનિકાએ રાજ્યનો સુવહીવટ કર્યો તેમ નાનાધાટના લખાણ પરથી દર્શાવેલ થાય છે. હજ્જપણ્ય તથા દક્ષિણમાં સ્ત્રી-વહીવટકર્તાનું ધણું કરીને આ પ્રથમ દર્શાવેલ છે.

વેદિશ્રીનું તરુણાવયમાં જ અવસાન થતાં સતીશ્રીએ પુખ્ત વયે પહોંચતાં વહીવટ સંભાળી લીધી. તે સાતકર્ણી બીજા તરીકે વિખ્યાત થયો. પુરાણોના વિવરણ પ્રમાણે તેણે સૌથી વધારે સમય (૫૫ વર્ષ) રાજ્ય કર્યું. હાથી ગુફા તથા બીલસાના લેખોમાં જે સાતકર્ણીનો ઉલ્લેખ કરવામાં આવ્યો છે તે આ સાતકર્ણી હોવાનું વિદ્વાનો માને છે.

સાતકર્ણી બીજા પછીનો અગત્યનો સાતવાહન રાજા 'હાલ' હતો. પૌરાણિક ચાંદીના ક્રમ પ્રમાણે સાતકર્ણી ૬ઠ્ઠા નંબરનો તથા હાલ ૧૭મા નંબરનો રાજા ગણાય. બન્ને વચ્ચે પુરાણોએ કેટલાક રાજાઓનાં નામ મૂકેલાં છે,^{૨૮} પરંતુ 'આપાલિક'ના અપવાદ સિવાય સિંહાઓ, તામ્રપત્રો કે અન્ય સાહિત્યમાં તેમનો નિર્દેશ નથી. હાલ પ્રથમ સૈકાની પહેલી પચીસીમાં થયો હોવાનું પુરાણો નોંધે છે. તે કવિરાજા હતો. તે કાવ્યો કરતો તથા પ્રાકૃતમાં લખાણો લખતો. પુરાણો, 'લીલાવર્ધ', 'અભિધાનચિન્તામણિ', 'દેશીનામગાળા' વગેરે ગ્રંથોએ પ્રાકૃત ભાષા તથા સાહિત્યને ઉત્તેજન આપનાર રાજવી તરીકે તેની બારે પ્રશંસા કરી છે. ૭૦૦ શ્લોકો ધરાવતું 'સતસાર્ધ' કે 'ગાથાસપ્તસતી' નામે પુસ્તક તેના દરબારમાં લખાયું હોવાનું મનાય છે. બાણ સાતવાહન રાજાના સાહિત્યપ્રેમને બિરદાવતાં સ્વાભાવિક રીતે આ પ્રથમી પ્રશંસા કરે છે. મેરુતંગ રચિત 'પ્રબંધચિંતામણિ'માં પણ આ ગ્રંથનાં વખાણ કરવામાં આવ્યાં છે. વિખ્યાત 'બૃહત્કથા'નો લેખક ગુણાદય ધણું કરીને હાલનો મંત્રી હતો અથવા તેનો ખાસ મિત્ર હતો. અગાઉ જણાવ્યું છે તેમ આ મહાપ્રથમ કમનસીબે ગુપ્ત ધ્રુવેલો છે પરંતુ હેમચંદ્ર રચિત પ્રાકૃત વ્યાકરણ, ભુદસ્વામી કૃત 'બૃહત્કથાશ્લોકસંગ્રહ', ક્ષેત્રેન્દ્ર લેખિત 'બૃહત્કથામંજરી' અને સોમદેવ પ્રણીત 'કથાસરિત્સાગર'માં તેના ઉતારા મળે છે.

^{૨૧} Pargiter, 'Dynasties of the Kali Age', pp. 40-73.

^{૨૭} Coins of the Andhra Dynasty—'Cambridge History of India', Vol. I.

^{૨૮} Pargiter, also 'Comprehensive History', p. 326.

પહેલા સેકા દરમિયાન (ઈ. સ. ૩૦થી ૬૦) શક-ક્ષત્રપ સત્તા ઉત્તરમાં ધણી પ્રમાણ બની. શક-ક્ષત્રપ નહાન તથા તેના જનાર્ધ ઉપવદતે રજપૂતાના, સૌરાષ્ટ્ર તથા ગુજરાતના ધણા ભાગ છૂટી લીધા. માળવા, મહારાષ્ટ્ર, કોંકણ વગેરેના ધણા પ્રદેશો પણ તેઓએ સાતવાહન ખાસેથી પડાવી લીધા. ઈ. સ. ૭૦ સુધીના સાતવાહન રાજ્યોમાં મંડલક, પુરીન્દ્ર સેન, સુન્દર સાતકર્ણી, મહેર સાતકર્ણી તથા શિવ સ્વાતી (પૌરણિક યાદી પ્રમાણે નં. ૧૮થી ૨૨)^{૧૪} શક-ક્ષત્રપોના ખંડિયા હોવાનો સંભવ છે. ઇરિથિયન સમુદ્રના અગાત્રીક લેખક પણ આ બાબતનો નિર્દેશ કરે છે. દખ્ખણનાં બંદરો સુપારા (હાલનું સોપારા) અને કમ્બીઅન (હાલનું કમ્બાથ) સરગેનસ રાજ(સુન્દર સાતકર્ણી)ને બદલે સંદેરસ (શક-ક્ષત્રપ) રાજ્યને હસ્તક આવતાં ત્રીક વેપારી વહાણોને મુકેલી જોખી થઈ એટલે તેઓ આ બંદરોને બદલે બરીનાઝ (હરુચ) બંદરે લાંચરવા લાગ્યાં.^{૩૦}

શક-ક્ષત્રપ સત્તાને મહાત કરીને ઉત્તર ભારતના અમુક ભાગોમાં તથા દખ્ખણના ધણા ભાગો પર સાતવાહન-સત્તા પુનઃસ્થાપિત કરનાર ગૌતમીપુત્ર સાતકર્ણી (ઈ. સ. ૭૨-૬૫) સૌથી મહાન સાતવાહન રાજા ગણાય છે. તેની માતા બલશ્રીએ સાતકર્ણીના અવસાન બાદ વીસ વર્ષે નાસિકની ગુફામાં કોતરાવેલા લેખ પરથી^{૩૧} સિદ્ધ થાય છે કે ગૌતમીપુત્રે આકર (પૂર્વ માળવા), અવન્તી (પશ્ચિમ માળવા), અનૂપ (નર્મદા પ્રદેશ), વિદર્ભ, અસ્તિક, આસક, મુલક (ઉત્તર મહારાષ્ટ્ર), અપરાન્ત (ઉત્તર કોંકણ) વગેરે પાછા મેળવ્યા. તેણે કુંકર (પશ્ચિમ રજપૂતાના), સુરથ (સૌરાષ્ટ્ર) તથા ગુજરાતના કેટલાક પ્રદેશો શક-ક્ષત્રપો પાસેથી પડાવી લીધા. દક્ષિણ કલિંગ તથા ઉત્તર આંધ્રને પણ તેણે પોતાના રાજ્યમાં જોડી દીધા. આમ તેણે દખ્ખણના સૌથી મોટા રાજ્યનું સર્જન કર્યું. નાસિક લેખના કથન મુજબ તેનું રાજ્ય ઉત્તરે વિન્ધ્યથી દક્ષિણે મલય પર્વત (ત્રાવણકોર) તથા પૂર્વે મહેન્દ્ર (પૂર્વઘાટ)થી પશ્ચિમે સઘાદ્રિ સુધી ફેલાયેલું હતું. તેણે ક્ષત્રિયો સામે બ્રાહ્મણો અને શૂદ્રોને રક્ષણ આપ્યાનું પણ પ્રશસ્તિ નોંધે છે. તેણે એક પણ અશ્વમેધ ધ્યાતો ઉલ્લેખ નથી, એટલે અશ્વમેધ કરવાની પ્રથા કદાચિત બંધ થઈ હોય તેમ દેખાય છે. નાસિક લેખ પરથી અનુમાન કરી શકાય કે તેનો વહીવટ ન્યાયી અને શાસ્ત્રોક્ત હતો. સમાજજીવનમાં મહત્વનાં પરિવર્તન થયાં હતાં. વર્ણશ્રમ ધર્મનું એકંદર પાલન થતું હોવા છતાંયે ધંધાના ધોરણે પેટાઝાતિઓમાં વધારો થયો હતો. તેણે પોતાના પુરોગામી ઉપવદતે આપેલાં દાનો આલુ રાખ્યાં એટલું જ નહિ, પરંતુ તેમાં ઘણા વધારો કર્યો. સારી સંખ્યામાં મળેલા તેના સિક્કાઓ તે સમયની સમૃદ્ધિનું સ્પષ્ટ કરે છે. તેના અનુગામીઓમાં પછીથી સામાન્ય બનનાર માતૃવંશી પૂર્વજ (ગૌતમીપુત્ર) ધારણ કરનાર સાતકર્ણી સૌમ્ય રાજવી હતો. કદાચિત પહેલાંના ક્ષત્રિય સાતવાહનોએ બ્રાહ્મણ કન્યાઓ સાથે લગ્ન કરતાં પ્રતિલોભ લગ્નને પરિણામે સાતવાહનોમાં વેદિક ગોત્રનાં માતૃવંશી નામે દાખલ થયાં હોવાનો સંભવ અણાય.^{૩૨} ગૌતમીપુત્ર સાતકર્ણીએ પોતાને એક બ્રાહ્મણ તરીકે સંબોધ્યો છે તે તેની માતા બ્રાહ્મણ હોવાનું સ્પષ્ટ કરે છે.

^{૧૪} Pargiter, also 'Comprehensive History', p. 326-27.

^{૩૦} V. A. Smith, 'Early History of India', 4th ed., p. 245.

^{૩૧} EP. Ind. Vol. VIII, p. 72.

^{૩૨} 'A Comprehensive History of India', Vol. II, p. 314.

ગોતમીપુત્ર સાતકર્ણી પછીના ધણીખરા સાતવાહન રાજ્યો નિર્માણ હતા. બીજા સૈકાના પાછલા અર્ધ ભાગમાં થઈ ગયેલા યજ્ઞથી સાતકર્ણી હેઠ્ઠે મહાન સાતવાહન રાજ્ય હતો. તેની પહેલાં મહાક્ષત્રપ કુદદામને સુરાષ્ટ્ર, ગુજરાત, મધ્ય પ્રદેશ તથા ઉત્તર મહારાષ્ટ્રના ધણી ભાગે સાતવાહનો પાસેથી જીતી લીધા હતા. પાછુંટરના કથન પ્રમાણે ધણીખરા પુરાણો યજ્ઞથીના શાસન દરમિયાન નવસંસ્કરણ પામ્યાં. વળી બાણ તથા હુનસંમના નિર્દેશ મુજબ નામાર્જુન નામે વિખ્યાત બૌદ્ધ પંડિત યજ્ઞથીના દરબારમાં થઈ ગયો. યજ્ઞથીએ તેને માટે ખાસ બૌદ્ધ મઠ બંધાવી તેની જ્ઞાનસાધનાને ઉત્તેજન આપ્યું.

યજ્ઞથીના અવસાન બાદ આંતરિક વિખવાદ તથા બહારનાં આક્રમણોથી સાતવાહન રાજ્ય પાંચ ભાગોમાં વિભાજિત થઈ ગયું. મહારાષ્ટ્રના ઉત્તર ભાગમાં ચૂળ સાતવાહન રાજ્ય વંશ ચાલુ રહ્યો. નાસિકની આસપાસનો પ્રદેશ આભિરોએ જીતી લીધો. કૃષ્ણા-મંથુરનો પૂર્વ પ્રદેશ ઇલ્લવાકુએ તાબે કરી લીધો. દખ્ખણના દક્ષિણ-પશ્ચિમ વિભાગમાં ચડુઓએ સત્તા જમાવી જ્યારે પદ્મવોએ દક્ષિણ-પૂર્વ પ્રદેશોમાં રાજ્યની સ્થાપના કરી.

રાજ્યવહીવટ

સામાન્ય રીતે સાતવાહન રાજ્યો 'રાજન'નો સાદો ખિતાબ ધારણ કરતા. ઉત્તર ભારતના રાજ્યોના ખિતાબો જેવા હાંબા ખિતાબોનો તેમનામાં અભાવ દેખાય છે. શિલાલેખો, સિક્કાઓ તેમ જ તેમને લગતા સાહિત્ય પરથી દક્ષિત થાય છે કે તેઓએ પોતાના હરીફ શક-ક્ષત્રપોએ ધારણ કરેલો સ્વામીનો ઇલકાબ પણ ધારણ કરેલો હતો. અપવાદરૂપ ગોતમીપુત્ર સાતકર્ણી તથા તેના પુત્ર પુલુભાષીને નાસિક પ્રશસ્તિમાં રાજરાજ તથા મહારાજ કહેવામાં આવ્યા છે. રાણી સામાન્ય રીતે દેવી તરીકે ઓળખાતી. પરંતુ ગોતમીપુત્ર સાતકર્ણીની માતા બલશ્રીને મહાદેવી કહેવામાં આવી છે. સાતવાહન રાજ્યો માતાના કુળના નામે ઓળખાતા તોપણ રાજ્યનો વારસો પિતાના વંશ પ્રમાણે જ મળતો. સાતવાહન વહીવટની મૌલિક વિશિષ્ટતા એ હતી કે તેમના શાસનમાં સાતકર્ણી જ્ઞાની પત્ની નાયનિકા કે નાગનિકાએ તથા ગોતમીપુત્ર સાતકર્ણીની માતા બલશ્રીએ ખાસ અમત્યનો ભાગ ભજવ્યો હતો. અનુક્રમે નાનાઘાટ લેખ તથા નાસિક લેખ તેમની કાર્યદક્ષતાના પુરાવારૂપ છે.

જોકે, રાજ્યતંત્રનું સ્વરૂપ માત્ર રાજશાહી હતું, પરંતુ સાતવાહન રાજ્યોના ખિતાબો પરથી જણાય છે કે તેઓ દેવી હકના સિદ્ધાંતમાં માનતા ન હતા. રાજ્યો એક કરતાં વધારે સ્ત્રીઓ પરચુતા, પરંતુ તેમના ઇતિહાસમાં વારસાના ઝંખડા ભાગ્યે જ નોંધાયા છે. તેઓ શાસના નિયમો પ્રમાણે શાસન ચલાવતા તથા વર્ણશ્રમધર્મનું રક્ષણ કરવાની રૂઢિગત માન્યતાથી મુક્ત ન હતા. પિતાની સાથે પુત્ર પણ શાસન ચલાવતો હોવાની પ્રથા સાતવાહનોમાં હતી કે કેમ તે સંબંધમાં વિદ્વાનોમાં મતભેદ છે.

સામંતોનું વર્ચસ્વ

સામંતોનું શાસન પર કેટલું અને કેટલું વર્ચસ્વ હતું તે પરત્વે પણ ઇતિહાસવિદો એકમત નથી, છતાં સાતવાહનોના પ્રથમ રાજા સિમુકે શક્તિશાળી રથિકા અને ભોળો (સામંતો)ની સહાયથી પોતાના વંશની સ્થાપના કરી હતી તેવો ઉલ્લેખ નોંધપાત્ર ગણાય. વળી તેણે રાજ્ય બનતા રથિકાને મહારથીઓ બનાવ્યા તે પણ સામંતશાહીની રાજ્યતંત્ર

પરની સરખાતથી જ પ્રભળ છાપ બતાવે છે. રાણી નાયનિકાનો પિતા ત્રંધીરે પણ મહાસામંત હોવાનું સચિત થાય છે. રાજ્યોએ તેમની સાથે લગ્નજનધે ભાંધીને (સાતકર્ણી) રાણાનાં નાયનિકા સાથેનાં લગ્ન) પોતાનું સ્થાન દૃઢ બનાવ્યું હોવાના પુરાવા પણ મળે છે. અમુક સામંતો રાજ્યનો પ્રભુત્વ પણ ધારણ કરતા. કારવાર (ઉત્તર કોંકણ) તથા કોલ્હાપુર પ્રદેશોના સામંતોએ પોતાના નામના સિક્કાઓ પણ પાડાવ્યા હતા.^{૭૭} 'મહારથી' અને 'મહાભોજ' પ્રકારના સામંતોનું સ્થાન રાજ્ય પછીનું મળ્યું. તેઓ આંતરિક બાબતમાં પોતાના પ્રદેશો પર લગભગ સ્વતંત્ર આધિપત્ય ભોગવતા હતા. સમસ્ત રાજ્યમાં સામંતોના પ્રદેશો તથા સરકારી પ્રદેશો અલગ અલગ હતા. સામંતો સીધા રાજ્યને જવાબદાર હતા. પ્રાંતિક તથા પ્રાદેશિક અધિકારીઓનો સામંતો પર અંકુશ ન હતો. અલગત કેટલાક સામંતો પણ પ્રાંત કે પ્રદેશના મુખ્ય અધિકારીઓ તરીકે કામ બજાવતા.

સાતવાહનોના ખાસ અધિકારીઓમાં અમાત્ય, રાજ-અમાત્ય, સેના-ગોપ, અધિવારક, વગેરેનો લેખો ઉલ્લેખ કરે છે. અમાત્ય વહીવટી, નાણાકીય તથા ન્યાય ખાતામાં કામ કરતો, જ્યારે રાજ-અમાત્ય ખજાનાખાતાના મુખ્ય અધિકારી અથવા મુખ્ય પ્રાંતિક અમલદાર તરીકેની ફરજો બજાવતો. ગૌતમીપુત્ર સાતકર્ણી કે તેના પુત્ર વાસિષ્ઠી-પુત્ર પુલુભાયે મહાસેનાપતિનું પદ ચાલુ કર્યું હોવાનું લેખો નોંધે છે. આ પદ કોઈ ઉચ્ચ ઉમરાવને જ અપાતું અને તેના મરણ બાદ તે પદ તેની પત્નીને મળતું તે નોંધપાત્ર લેખાય. બીજી સદીને અંતે તામિલ ભાષાનો શબ્દ તલવાર (સેનાપતિ) કે મહાતલવાર આ પદને કારણે ખૂબ પ્રચલિત બન્યો.^{૭૮}

સાતવાહન રાજ્યના વહીવટી વિભાગો વિષે સાધનો ખાસ પ્રકાર પાડતાં નથી, પરંતુ જનપદ (પ્રાંત), આહાર (ગિલ્ડો કે તાલુકો) તથા ગ્રામ મુખ્ય વહીવટી વિભાગો હતા. જનપદમાં રાજ-અમાત્ય મુખ્ય અધિકારી હતા. ગ્રામમાં ગ્રામપતિ હસ્તક વહીવટ ચાલતો. આહાર વિષે ખાસ માહિતી મળતી નથી. પરંતુ સાતવાહન વહીવટી તંત્ર એકંદરે મોંઘે વહીવટી તંત્રની દબે રચાયેલું હતું. લગભગ આ જ પરિપાટી પર સાતવાહનોના અનુગામી ઇલ્વાકુ, ચંદ્ર, વાકાટક વગેરેએ પોતાનાં રાજ્યતંત્ર રચ્યાં હતાં.

SUMMARY

So-called Dark Ages of Ancient Indian History-2

The Sātavahan Age

(From 230 B.C. to 230 A.C.)

Introduction :

Documentary evidences are not many, but they are not less authentic. Most of them prove that the Sātavāhan empire was perhaps the first and oldest empire of the Deccan. The

^{૭૭} Rapson, 'Coins of Andhra Dynasty', pp. XXII, 59-60; pp. XX, XXII, 57-58.

^{૭૮} 'Epigraphia Indica' Vol. VIII, p. 65.

Sātavāhans laid the foundation of the political as well as cultural unity of the Deccan.

Sources — Archaeological :

They are not enough and not able to furnish enough details about the age of Sātavāhans. Only 26 inscriptions of 30 Sātavāhan kings have been obtained up to now. Nānāghāt, Nāsik and Bhattiprollu inscriptions give good many details of certain Sātavāhan kings and their functions. Several coins also reveal some important facts. Other archaeological findings do not throw new light on the Sātavāhans.

Sources — Literary :

Purānas, though less authentic are useful. They refer to Sātavāhans as Āndhras, while inscriptions, coins and other literary sources call them Sātavāhans or *Sātakarnis*. *Gunādhyā's celebrated Brithatkathā*, believed to be written in the Age of the Sātavāhans, though lost in its original form, survives through translations of several of its portions by different authors.

Meaning of the Word Sātavāhan :

Words like Āndhra, Āndhraka, Āndhrabhrutya, Āndhrajātiya etc. are mentioned by Purānas, while words such as Sātavāhan, Sātakarni, S'ātakarni etc. are referred to by inscriptions and coins. Scholars opine that Āndhra is a geographical term, while Sātavāhan or Sātakarni indicates the family name. It may be connected with Saptavāhan (The Sun or Vishṇu).

Original Place :

Some scholars believe that the original place of the Sātavāhans was on the West side of the Deccan, others opine that it was on the east side of the Deccan. Most of the inscriptions and coins of the early age have been found from the West side. Other archaeological evidences indicate the same thing.

Cast :

Probably belonged to the mixture of Brāhman-Nāga caste. Inscriptions hint at it.

Important rulers :

Simuk or Shishuk or Sindhuk was the first ruler of the dynasty. There is great difference of opinion among the Scholars with regards to his time. Satakarni I was the next important king. Nānāghāt inscription excavated by his queen Nāyanikā after twenty years of his death, furnishes very interesting details about him. Nāyanikā in the name of her minor sons administered the kingdom very well with the help of her father Trankayiro. Other important Sātavāhan kings were Satakarni II, Hāl and Gautamiputra Satakarni. Nāsik inscription, excavated by Balasiri, mother of Gautamiputra Satakarni gives very useful details about Gautamiputra Satakarni. Yajña Sri Satakarni was the last great king. After his death the Sātavāhan Kingdom disintegrated. As a result the independent states of Ābhiras, Ikshvākus, Chattus and of Pallavas came into existence.

Administration :

Generally the Sātavāhan rulers held the simple titles of Rājans or Swāmi. Queens or Queen mothers played a predominant role in administration. Usually the kings ruled according to the injunctions of the Shāstras and they were not free from the traditionalism. Feudal lords held great sway over the administrative machinery and they possessed vast territories in the Kingdom, which they managed independently.

There were officers like Amātya, Rajāmatya, Senā-Gopa, Ashva-Vāraka etc. Some great feudal lords were designated as Mahāsenāpatīs. There were also administrative units like Janapada, Āhara and Grāma. The Sātavāhanas generally followed the Mauryan Pattern of administration.

SOME PROGRESSIVE AND REACTIONARY FEATURES OF THE PRE-INDEPENDENCE INDIAN NATIONALISM

by

P. H. PAREKH

K. H. M. Arts and Commerce College, Porbandar

As in the other parts of the world, nationalism has been one of the greatest political phenomena of the modern Indian History. Nationalism is the political product of the post-feudal economic and social transformations. In India it fell to the British to destroy the feudal society and lay the foundations of a modern society. Marx was one of the first political writers to point out this fact. England, in Marx's view, had "a double mission in India: the one destructive, the other regenerating—the annihilation of the old Asiatic society, and the laying of the material foundations of Western society in India."¹ The complete destruction of the old social structure not being in the British imperial interests, the socio-economic structure which emerged in India was a semi-feudal and a semi-modern one; in other words it was colonial.

India was one of the most civilized countries of the ancient world. But it was her material and moral decay which led to her subjection under the British. Thus modern India had to face many problems arising both from her material-moral decline as well as from her subjection. Inevitably under the circumstances there took place a remarkable fusion of nationalism, renaissance and religio-social reform movements in modern India. Regarding the significance of this fusion K. K. Datta writes: "Indian nationalism has not been a mere political phenomenon. It proved to be a dynamic force of gigantic magnitude influencing modern Indian life in various ways."²

¹ Quoted by R. P. Dutt in his '*India Today*', p. 39.

² Quoted from the preface to his '*Renaissance, Nationalism and Social Changes in Modern India*'.

Progressive features of Indian Nationalism

Indian nationalism was characterised by tolerance and wide sympathies. Its orientation was humanist and international. It was almost free from xenophobia. It had a positive social content.

Indian nationalism was very much tolerant of various religious and cultural groups. India was conceived as the motherland of all Indians irrespective of their caste, creed and community.

Even Aurobindo, who drew his inspiration from Hindu religion and culture, wrote: "Nationalism depends for its success on the awakening and organizing of the whole strength of the nation, it is therefore vitally important for nationalism that the politically backward classes should be awakened and brought into the current of political life; the great mass of orthodox Hinduism which was hardly ever touched by the old Congress movement, the great slumbering mass of Islam which has remained politically inert throughout the last century, the shopkeepers, the artisan class, the immense body of illiterate and ignorant peasantry, the submerged classes, even the wild tribes and races still outside the pale of Hindu civilisation, Nationalism can afford to neglect and omit none. It rejoices to see any sign of life where there was no life before, even if its first manifestations should seem to be ill-regulated or misguided. It is not afraid of Pan-Islamism, or any signs of the growth of a separate Mohammedan self-consciousness but rather welcomes them."³

Pheroze Shah Mehta wrote: "To my mind, a Parsi is a better and truer Parsi, as a Mohammedan, or a Hindu, is a truer Mohammedan or Hindu, the more he is attached to the land which gave him birth, the more he is bound in brotherly relations and affection to all the children of the soil, the more he recognizes the fraternity of all the native communities of the country, and immutable bond which binds them together

³ Quoted by Dr. Karan Singh in his '*Prophet of Indian Nationalism*', pp. 77-78.

in the pursuit of common aims and objects under a common government." ⁴

Gandhiji and Nehru were the two supreme leaders of the freedom movement in India. Both were great humanists. Therefore, their humanism within and without the bounds of nationalism cannot be overemphasised.

Sympathy for the national liberation movements of all subject peoples and for the fight for constitutional rights in any part of the world was another progressive feature of Indian nationalism. The conception of Indian nationalism was very broad. Indians conceived themselves to be a part of a larger humanity. Sense of human brotherhood has always remained as the basis of Indian nationalism. Indian nationalism has, therefore, been almost free from xenophobia.

Raja Rammohan Roy, the father of modern India, took a keen interest in the international affairs of his times. 'The Raja was always on the side of liberty and constitutionalism. On the news that the people of Naples were thrown back under Austrian despotism, the Raja wrote to Mr. Buchingham, begging to be excused from an important engagement, as he was much "depressed by the late news from Europe." He added, "I am obliged to conclude that I shall not live to see liberty universally restored to the nations of Europe and Asiatic nations, specially those that are European colonies . . . Under the circumstances I consider the cause of the Neapolitans as my own and their enemy as ours. Enemies to liberty and friends of despotism have never been and never will be ultimately successful." ⁵ His biographer, Miss Collett, also tells us how "at Cape Colony on his way to England, the sight of the tricolour flag on the French ships lying at anchor in Table Bay fired his enthusiasm. Lame as he then was owing to a serious fall from the gang way ladder he insisted on visiting

⁴ Quoted by Homy Mody in his '*Sir Pheroze Shah Mehta, a Political Biography*,' pp. 141-142.

⁵ Quoted by O. P. Goyal in his '*Studies in Modern Indian Political Thought*', p. 21.

them. The sight of the republican flag seemed to render him insensible to pain."⁶

He was much interested in the Reform Bill of 1832 in England and wrote: "The struggles are not merely between the reformers and anti-reformers, but between liberty and oppression throughout the world; between justice and injustice, and between right and wrong."⁷ He also suggested the formation of a league of nations for the peaceful settlement of international disputes and also as an expression of the unity of mankind.

Aurobindo wrote: "Our ideal of patriotism proceeds on the basis of love and brotherhood and it looks beyond the unity of the nation and envisages the ultimate unity of mankind. But it is a unity of brothers, equals and free men that we seek, not the unity of master and serf, of devourer and devoured."⁸

Nehru's numerous speeches and writings testify to his humanism and internationalism. He said that problems men faced were problems of humanity: "And unless we solve them for the whole world, there will continue to be trouble. Such a solution can only mean the ending of poverty and misery everywhere. This may take a long time but we must aim at this and nothing less than this. Only then can we have real culture and civilization based on equality, where there is no exploitation of any country or class. Such a society will be a creative and a progressive society, adapting itself to changing circumstances, and basing itself on the co-operation of its members. And ultimately it must spread all over the world."⁹

He also wrote: "The struggle for Indian freedom is essentially a part of the world struggle for the emancipation of the exploited everywhere and for the establishment of a new social order."¹⁰

⁶ Ibid., pp. 21-22.

⁷ Ibid., p. 22.

⁸ Quoted by Dr. Karan Singh in his above mentioned book, p. 153.

⁹ Quoted by M. N. Das in his '*The Political Philosophy of Jawaharlal Nehru*', p. 69.

¹⁰ Ibid., p. 193.

Indian nationalism was very sensitive to the international developments. Rise of Facism and Nazism in Europe was viewed with profound dismay by the Indian leaders. It was this sensitivity which prevented the Congress leaders from launching mass movement for freedom during the early years of the Second World War. It was sheer desperation which drove them to launch a mass struggle in August 1942 with the slogan of 'Quit India'. Even then Nehru had his doubts about the wisdom of launching a mass movement at such a critical juncture in the war when Japan was knocking at the doors of India in the east.

Regarding the absence of xenophobia in the Indian Nationalist movement Nehru wrote: "... and yet Gandhi gave a touch to our nationalist movement which lessened the feelings of frustration and bitterness. Those feelings continued but I do not know of any other nationalist movement which has been free from hatred. Gandhi was an intense nationalist; he was also, at the same time, a man who felt he had a message not only for India but for the world, and he ardently desired world peace. His nationalism, therefore, had a certain world outlook and was entirely free from any aggressive intent."¹¹

This trait of Indian nationalism found its best expression in Nehru's attitude and behaviour. Both Attlee and Mountbatten were surprised to find in Nehru a complete lack of hatred for Britain. Attlee wrote: "Several years of imprisonment by the British Government in India had not soured or embittered him."¹² And wrote Mountbatten: "When I went to India as Viceroy a year later to arrange the transfer of power, his statesmanlike approach, untinged by any bitterness over his long imprisonment in British jails, was of the greatest help to me."

It is a significant fact that Nehru and Krishna Menon were mainly responsible for India's remaining in the Commonwealth. Both intensely hated British imperialism; and yet both intensely loved Britain — her people, her culture, her democratic

¹¹ 'Discovery of India', p. 445.

¹² 'A Study of Nehru', Edited by Dr. Rafiq Zakaria, p. 106.

¹³ Ibid., p. 110.

Desire to modernise the Indian society was also a progressive feature of Indian nationalism. Inside the Indian National Congress this trend was represented by Nehru who tried to put a positive social content into Indian nationalism. He wrote : "My outlook was wider, and nationalism by itself seemed to me definitely a narrow and insufficient creed. Political freedom, independence were no doubt essential, but they were steps only in the right direction; without social freedom and a socialistic structure of society and the State, neither the country nor the individual could develop much."¹⁴

Outside the Congress this trend was represented by the Socialists, the Communists and a few intellectuals. But it was a weak trend because the dominant leadership of the freedom struggle— Gandhiji and the Congress High Command —was backward-looking and did not wish to modernise the Indian society.

Reactionary features of Indian Nationalism

Alongwith the above mentioned progressive features Indian nationalism also possessed certain reactionary features. These features became prominent during the last decade of the nineteenth century and the first decade of the twentieth century. During this period, an extremist and a 'spiritual' nationalism developed inside and outside the Congress, represented by Aurobindo and the trio Lal-Bal-Pal.

These leaders drew their inspiration from the ancient Hindu religion and culture. They extolled the 'spiritualism' of the Indian culture and condemned the 'materialism' of the Western culture. Barring a few references here and there in their writings and speeches they almost ignored the Muslims and other minorities, their contribution to Indian culture and their place and problems in the contemporary Indian society. All this will become clear from the following quotations :

"To bring in the mass of the people, to found the greatness of the future on the greatness of the past, to infuse Indian politics with Indian religious fervour and spirituality are the

¹⁴ Quoted by M. N. Das in his above mentioned book, p. 126.

indispensable conditions for a great and powerful political awakening in India."—AUROBINDO¹⁵

"....For what is a nation? What is our mother country? It is not a piece of earth, nor a figure of speech, nor a fiction of the mind. It is a mighty Shakti, composed of all the Shakties of all the millions of units that make up the nation just as Bhavani Mahisha Mardini sprang into being from the Shakti of all the millions of gods assembled in one mass of force and velded into Unity. The Shakti we call in India, Bhavani Bharati, is the living unity of the Shakties of the three hundred million people...."—AUROBINDO¹⁶

"The ideal of unqualified Swaraj has a charm for the national mind which is irresistible if it is put before it in the national way by minds imbued with Indian feeling and free from the gross taint of Western materialism. Swaraj as a sort of European ideal, political liberty for the sake of political self-assertion, will not awaken India. Swaraja as the fulfilment of the ancient life of India under modern conditions, the return of the Satyayuga of national greatness, the resumption by her of her great role of teacher and guide, self-liberation of the people for the final fulfilment of the Vedantic ideal in politics, this is the true Swaraja for India...."—AUROBINDO¹⁷

"The Hindu nation was born with Sanatan Dharma; with it, it moves and with it, it grows. When the Sanatan Dharma declines then the nation declines and if the Sanatan Dharma were capable of perishing with the nation it would perish. The Sanatan Dharma, that is Nationalism."—AUROBINDO¹⁸

Bipinchandra Pal also wrote in the similar vein:

"This new Nationalist movement in India is essentially a spiritual movement.The philosophy that stands behind

¹⁵ Quoted by Dr. Karan Singh in his above mentioned book, p. 93.

¹⁶ Ibid., pp. 70-71.

¹⁷ Ibid., pp. 80-81.

¹⁸ Quoted by O. P. Goyal in his above mentioned book, p. 101.

it is the philosophy of the Absolute, the philosophy of Brahman, as applied to the interpretation of man's social and economic life."¹⁹

He also wrote: "All those old and traditional gods and goddesses who had lost their hold upon the modern mind have been reinstalled with a new historic and nationalistic interpretation in the mind and the soul of the people. Hundreds of thousands of our people have commenced to hail their motherland today as Durga, Kalee, Jagadhatree."²⁰

Lala Lajpatrai defined nationalism to mean "one common name, a common ancestry, a common history, a common religion, a common language, and a common future."²¹

This 'spiritual' nationalism was reactionary from many points of view. By giving a Hindu garb to Indian nationalism it created suspicions in the minds of the minorities, especially the Muslims. It had fatal consequences for the national unity and it ultimately led to the vivisection of the motherland. By glorifying the Indian 'spiritualism' and condemning the Western 'materialism' it set its face against the many progressive aspects and developments of the modern Western civilization. It was also irrational because the modern society cannot be reconstructed on the model of the past nor can the problems of today be solved by the solutions of yesterday

In certain respects Gandhiji further developed this reactionary and irrational trend. Of course, there were fundamental differences between Gandhiji and the extremist-cum-spiritual nationalists. No two beliefs can be farther apart from each other than Gandhiji's belief in non-violence and extremist nationalists' belief in terrorism and mass violent insurrection. But both glorified India's past, extolled the Indian 'spiritualism' and condemned the Western 'materialism'. Moreover, Gandhiji was more irrational, because instead of following the dictates of reason he often relied on his intuition and 'inner voice'

¹⁹ Ibid., p. 63.

²⁰ Quoted by K. K. Dutta in his above mentioned book, p. 9.

²¹ Quoted by O. P. Goyal in his above mentioned book, p. 90.

Summary

1. Nationalism has been one of the greatest political phenomena of modern Indian history.
2. It has been characterised by certain progressive and certain reactionary features.
3. Tolerance and wide sympathies, humanism and internationalism, a lack of xenophobia, a positive social content—these were some of the progressive features.
4. Irrationalism, glorification of the past, 'spiritualization' of nationalism and politics drawing its inspiration from Hindu religion were some of the dominant reactionary features.

ગોખલે: ગાંધીજીના રાજકીય ગુરુ

જયંતીલાલ પી. ગજ્જર, એમ.એ.
ભાષાંતરકાર, ગુજરાત યુનિવર્સિટી, અમદાવાદ-૬

[સોમવાર તા. ૬મી મે, ૧૯૧૬ના રોજ સમગ્ર ભારતમાં સ્વ. ગોપાલકૃષ્ણ ગોખલેની જન્મશતાબ્દી ઉજવાઈ તે પ્રસંગે લખાયેલ ખાસ લેખ]

ઐતહાસિક સદીના ઉત્તરાર્ધમાં મા ભારતીયે સ્વાતંત્ર્યસંગ્રામના અનેક નામી-અનામી સેનાનીઓને જન્મ આપી સ્વાતંત્ર્યના મહાવૃક્ષનાં બીજ રોપાવ્યાં. એ બીજરોપકામાં ગોપાલકૃષ્ણ ગોખલે તેમની મહાન દેશભક્તિ અને વિશિષ્ટ પ્રતિભાને કારણે સ્વાતંત્ર્ય સંગ્રામના ઇતિહાસમાં મહત્ત્વનું સ્થાન ધરાવે છે. પૂજ્ય ગાંધીજીએ આ મહાપુરુષની મહત્તાને બિરદાવતાં કહેલું, “વાચકને મારો દાવો બલે આશ્ચર્યકારક લાગે, પણ ગોખલેને મેં મારા રાજકીય ગુરુ ગણ્યા છે.” પૂજ્ય ગાંધીજીના આ રાજકીય ગુરુની જન્મશતાબ્દી તારીખ નવમી મે, ૧૯૧૬ના રોજ સારાય દેશમાં ઉજવાઈ રહી છે તે પ્રસંગે આ મહાનુભાવનાં જીવન અને કાર્યોની ઝાંખી કરી એમને અંતરતમ શ્રદ્ધાંજલિ અર્પીએ.

ગોપાલકૃષ્ણ ગોખલેનો જન્મ તા. નવમી મે, ૧૮૬૬ના રોજ રત્નાગિરિ જિલ્લાના ચિપલુન તાલુકાના ફેટલુક ગામમાં થયો હતો. તેમના પિતાનું નામ કૃષ્ણરાવ અને માતાનું નામ સલ્માબાઈ હતું. ઉદાત્ત ચારિત્ર્ય, આત્મમનોબળ અને સ્વમાન માટે જાણીતા આ ગોખલે કુટુંબના સર્વ ગુણો બાલ ગોપાલમાં ઊતર્યા હતા. સત્યનિષ્ઠા, પ્રમાણિકતા, સ્વમાન અને નિર્ભયતાની કસોટી કરતા ફેટલાક પ્રસંગો તેમના વિદ્યાર્થીજીવનમાં બન્યા હતા, જેમાં તેઓ સાંગોપાંગ પાર ઊતર્યા હતા. મરીમ માયાપના આ સંતાનમાં માનવતા ભારોભાર હતી. વિદ્યાર્થી તરીકેની તેમની કારકિર્દી તેજસ્વી હતી. તેમની પ્રમાણિક કારકિર્દીનાં શ્રી રાનડેએ મુકતાકંઠે વખાણ કર્યાં હતાં.

ઈ. સ. ૧૮૮૪માં મુંબઈની એન્જિનિયરિંગ કોલેજમાંથી ગણિતશાસ્ત્ર વિષય સાથે બી.એ. થયા પછી એન્જિનિયર, આઈ.સી.એસ. કે વકીલ થવું એ પ્રશ્ન એમને મુંઝતી રહ્યો. અને લાંબા વિચારને અંતે તેઓએ એલએલ.બી ના અભ્યાસને પસંદગી આપી; પણ સંજોગોવશાત્ તેઓ તે પૂરો કરી શકેલ નહિ. તેમનું માનસ પહેલેથી જ સમાજસેવા માટે વલણ ધરાવતું હતું. ગોખલેના રાજકીય અને સેવાકીય વલણને બિરદાવતાં ડૉ. પરંજપે કહે છે:

“Just think of Gokhale as an engineer, or a lawyer or even as an Indian Civil Servant. Well was it for the country that such a fate was not to be Gokhale's and that he was

destined to become the expert engineer under whose lo and watchful eyes the edifice of India's political progress to be pushed forward, the eloquent pleader who would plead the course of India before the public in India, Eng and South Africa, in the Supreme Legislative Council in private before Cabinet Ministers like Morley and B or the devoted 'Servant of India' rather than an Indian C Servant."

ગોખલેનું માનસ સેવાપરાયણ હતું, પણ તેમની કૌટુંબિક પરિસ્થિતિ તેમને માટે દરજ્જા માફી સહી હતી, તેથી તેમણે પૂનાની ન્યુ ઇન્સ્ટિટ્યુશન ઓફ શિક્ષક તરીકે નોકરી કરી. શિક્ષણ અને શિક્ષણ સંસ્થાઓના વિકાસમાં તેમને અત્યંત હિત હતો. તેથી જ ડેક્કન એજ્યુકેશન સોસાયટીના તેઓ આજીવન સભ્ય બનેલા. શિક્ષકને આત્મા સુધારકવાદી પણ હતા. રાષ્ટ્રીય જાગૃતિ માટે સુધારાને તેઓ મહત્વનું અંગ હતા. તેમનાં પ્રેરક અને મનનીય પ્રવચનો તથા લખાણો ધારી અસર પાડી શકતાં. 'સુધારક'ના અંગ્રેજી વિભાગના તંત્રી હતા. 'મરાઠા' અને 'કેસરી'માં પણ અવાજ લખતા હતા. ૧૮૯૫માં 'રાષ્ટ્રસભા સમાચાર'નું તંત્રીપદ તેમણે સ્વીકાર્યું હતું. સૌપ્રથમ જાહેર વ્યાખ્યાન ઈ. સ. ૧૮૮૬માં કાલકાપુરમાં 'ઇડિયા અન્ડર બ્રિટિશ રુલ' આપ્યું હતું. તેમના બાળપ્રભુત્વ અને વાક્યાનુભૂતિ પ્રેરાઈને જ કોંગ્રેસે ઇંગ્લેન્ડની ભારતની સાચી પરિસ્થિતિથી વાકેફ કરવા ઈ. સ. ૧૯૦૬માં લાલા લજપતરાય ઇન્ડિયામાં પ્રવચન-પ્રવાસ માટે મોકલ્યા હતા. અંગ્રેજો પણ એમના વાણીપ્રભાવ અને હલીલશક્તિ પર મુગ્ધ થઈ ગયા હતા. એમની વ્યાખ્યાન શક્તિની પ્રશંસા કરતાં સર ચંદરવાદર લખે છે, "ગોખલે એક પ્રભાવશાળી વક્તા હતા. વાક્યહટાથી પ્રભાવિત પ્રેક્ષકોને મુગ્ધ કરી દે તે અર્થમાં તેઓ પ્રખર વક્તા નહોતા, પણ સ્પષ્ટ, તર્કબદ્ધ શૈલીમાં હકીકતોની રજૂઆત અને તે તથ્યોમાંથી નિષ્કર્ષ તારવવાની અસરકારક રીત તેમનાં લક્ષણો હતાં."

ગોખલેએ પ્રારંભથી જ પોતાનું જીવન લોકહિત, દેશભક્તિ અને રાષ્ટ્રીય જાગૃતિ તરફ વાળ્યું હતું. રાજકીય ક્ષેત્રે તેમણે સૌપ્રથમ પ્રવેશ કર્યો ઈ. સ. ૧૮૮૫માં કોંગ્રેસ અધિવેશન ભરાયું ત્યારે એક સક્રિય કાર્યકર તરીકે. ત્યાર પછી કલકત્તા અને અલાહાબાદનાં કોંગ્રેસ અધિવેશનોમાં તત્કાલીન પ્રશ્નો પર એક ભારતીય દિગ્દેશ્ય કરી મહત્વપૂર્ણ વ્યાખ્યાનો આપ્યાં, અને એક રાજપુરુષ તરીકે સિદ્ધિ પ્રાપ્ત તેમની બહુમુખી પ્રતિભાને કારણે જ ઈ. સ. ૧૮૯૫માં રાષ્ટ્રીય કોંગ્રેસના સહયોગી તરીકે મહત્વનું પદ પામ્યાં. ઈ. સ. ૧૯૦૫માં બનસરસ કોંગ્રેસ અધિવેશનના પ્રમુખપદેથી તત્કાલ રાજકીય પરિસ્થિતિની જાણવટ કરી કેટલાંક નક્કર સ્વચ્છતાની સાથે સાથે કોંગ્રેસના બેંચ સીનું ધ્યાન ખેંચ્યું હતું. ગોખલેના આખા પ્રમુખીય વ્યાખ્યાનને 'ટાઇમ્સ ઓફ ઇન્ડિયા' દૈનિકે 'a passionate and acrid onslaught' તરીકે ઓળખાવ્યું હતું.

ગોખલેના જીવનનું કીર્તિવંત વર્ષ ઈ. સ. ૧૯૦૫નું વર્ષ હતું. આ જ વર્ષે તેઓ પૂના યુનિવર્સિટીના પ્રમુખ તરીકે ચૂંટાયા હતા. વળી તેમની સ્થિતિને કારણે ચિરંજીવ રાજે તેની સંસ્થા 'સર્વન્દ્ર સ્વ ઓફ ઇન્ડિયા સોસાયટી'ની સ્થાપના પણ આ વર્ષે કરી હતી. આ જ વર્ષે તેમણે 'યુનિવર્સિટી એજીકેશન બિલ'નો વિરોધ કર્યો હતો. તે ઉપરાંત અઢાળપનની ચર્ચામાં (૧) મીઠાના કરમાં ઘટાડો, (૨) કૃષિકારોને સહાય આપવાની, (૩) સેવાઓના ભારતીયકરણ વિષે મહત્વપૂર્ણ વ્યાખ્યાનો આપ્યા હતાં. તેમનાં આ વ્યાખ્યાનો અને અગ્રાજી મુંબઈ વિધાન સભાના સભ્ય તરીકે 'જર્મીન સોંપણી બિલ' તથા 'ગિલ્ડા યુનિવર્સિટી બિલ' જેવાં બિલ પરની ચર્ચાએ એવડીઓ અને પ્રજામાં માન જન્માવ્યું હતું.

તેમના જીવનનું એક મહત્વનું પ્રદાન તે ભારતમાં મહત્ત્વ પ્રાથમિક શિક્ષણ દાખલ કરવાની કુશળતાને મળ્યાવી શકાય. ૧૮મી માર્ચ, ૧૯૧૦ના રોજ મહત્ત્વ પ્રાથમિક શિક્ષણની જરૂરિયાત સ્વિકૃત સમજાવતાં કેટલાંક નક્કર સૂચનો સાથે ઠરાવ પેશ કર્યો હતો. આ વ્યાખ્યાન પ્રજા પર તેમણે ખૂબ જ ગ્રીણવટપૂર્વક સર્વપક્ષી વિચાર કર્યો હતો, તે વિષે શ્રી. ટી. વી. પર્વતે લખે છે :

"One of the questions which Gokhale pursued with the zeal of a crusader and the mental attitude of a yogi was the question of free and compulsory primary education. He bestowed such case, such study, such thought and such close circumspection on all conceivable sides of the question as to make one feel that he considered himself the policy-maker in that behalf."

ગોખલેએ તેમના સમગ્ર જીવન દરમિયાન સાત વાર ઇંગ્લેન્ડની મુલાકાત એક વા ખીજા કારણે લીધી હતી. તેમની પ્રથમ મુલાકાત ઈ. સ. ૧૮૯૭માં વેલ્થે કમિશન સમક્ષ કેટલાંક પુરાવાઓ રજૂ કરવા અને અંતિમ મુલાકાત ઈ. સ. ૧૯૧૪માં પબ્લિક સર્વિસ કમિશનના ઉપક્રમે યોજાઈ હતી. ઇંગ્લેન્ડની તેમની મુલાકાત દરમિયાન ભારતીય પ્રજામત ઇંગ્લેન્ડમાં ફેલાવવાનું તેઓ ચૂકતા નહિ. તેમનાં વિદેશનાં અનેક વ્યાખ્યાનોમાં સિવરપુલ ખાતેનું તેમનું વ્યાખ્યાન ખૂબ જ મહત્વનું લેખાય છે. ઇંગ્લેન્ડ ઉપરાંત ગોખલેએ આફ્રિકાની મુલાકાત પણ લીધી હતી, અને 'રેબેલ'ના પ્રજા હલ કરવામાં ગાંધીજીને સહાયક બનવાનો પ્રયાસ કર્યો હતો. એમની આ બધી વિદેશી મુલાકાતોને કારણે તેઓને પશ્ચિમના લોકોના સંસ્પર્શમાં આવવાનું બન્યું હતું; અને પરિણામે તેમનામાં પૂર્વ અને પશ્ચિમની સંસ્કૃતિનું અજાન મિશ્રણ હતું.

ગોખલેએ એક જ ક્ષેત્રમાં રહી એકપક્ષી કાર્ય જ નથી કર્યું. યુનિવર્સિટી સેનેટના સભ્ય તરીકે, સિન્ડિકેટના સભ્ય તરીકે, પબ્લિક સર્વિસ કમિશનના સભ્ય તરીકે, વિવિધ સામયિકોના તંત્રી તરીકે, રાષ્ટ્રીય કોંગ્રેસના સભ્ય તરીકે, મુંબઈ વિધાનસભાના સભ્ય તરીકે, 'સર્વન્દ્ર સ્વ ઓફ ઇન્ડિયા સોસાયટી'ના અગ્રણી તરીકે અને એક લોકસેવક તરીકે પોતાની

વિશિષ્ટ સેવાઓ આપી ભારતીય પ્રજામાં નવજાગૃતિ અને ચેતના પ્રસારવામાં મહત્ત્વ કાર્યોથી માત્ર ભારતની પ્રજાને જ નહિ, અંગ્રેજોને પણ પ્રભાવિત કર્યા હતા.

ગોખલે તેમની નિષ્ઠા, સહાયીપણું અને સ્વદેશભક્તિને કારણે વિશાળ મિત્રો ભંડુ કરી શક્યા હતા. અનેક દેશો અને વિદેશો મિત્રો તેમના પ્રશંસક અને ચાહક હતા. કવિત્રી સરોજિની નાયડુ તો તેમનાં ખાસ સાથીદાર હતાં. નાનામોટાં સૌ મિત્રો સ્વીકારતાં ગોખલે ધન્યતા અનુભવતા. ગોખલેના જીવન પર સૌથી વિશેષ અસર રાનડેની. 'રાનડે આમ કહેતા' એવું તો એમના મુખે અનેક વાર સાંભળવા મળતું. રાનડે પ્રત્યેના પૂજ્યભાવ મૂર્તિમંત થતો. ડેક્કન સોસાયટીમાં જોડાયા પછી થોડા વખત જ રાનડેના સંપર્કમાં આવવાનું અહેવાલ્ય તેમને સંપર્કમાં હતું રાનડેની વિદ્વતા દેશ અને 'સાદુ' જીવન તથા ઉચ્ચ વિચાર માંથી અનેક યુવકો પ્રેરણા લેતા. એમણેએ સુધી આ યુગના ચરણોમાં એક સાચા અનુયાયી તરીકે સ્થાન જમાવી રાનડેના વિશ્વાસ હૃદય છતી લીધાં હતાં. ગોખલેમાં સહૃદયતાનો ગુણ હોવાથી એમના સંપર્કમાં આ મિત્રો થઈ જતા હો. જીવરાજ મહેતા પણ ગોખલેના અંગત સંપર્કમાં આવ્યા હતા. ઈ ૧૯૧૪માં વિચિત્ર (ફાન્સ)માં ગોખલેના તબીબ તરીકે પણ તેમણે સેવાઓ આપી હતી.

એક નેતા અને આઝાદીની લડતના અમૂલ્ય તરીકે ગોખલે સૌથી જુદા તરીકે આ અંગે એમ. એન. કુંઝુના શબ્દો નોંધપાત્ર છે: "સ્વાતંત્ર્યનું ખ્યેમ હાંસલ ગોખલેએ આખર સુધી વ્યથા પરિશ્રમ કર્યો હતો. સ્વાતંત્ર્યની ખુબેશ અંગે બંધારણીય ખુબેશ ચલાવવાના મતના હતા. પરંતુ બંધારણીય ચળવળ અંગેના વિચારો ખીળ ભારતીય નેતાઓના વિચારો કરતાં ધણુ વિશાળ હતા; આમ છતાં બંધીય બંધારણીય બાબતોને ડહાપણુભરી અને ચોખ્ખ લેખતા નહોતા. તેઓ શક્ય વ્યાવહારિક બાબતોને અલગ તારવી લેતા. તેઓ જાહેરમતના દબાણ દ્વારા બંધા સત્તાવાળાઓ પાસે છત્તિન સુધારાઓ કરાવવામાં માનતા હતા તેઓ શિખાઉ રાજકી માનતા નહોતા." અને રાજકારણમાં પણ સત્યના તેઓ આમહી હતા. તેઓ અવાર દશાન્ત તરીકે માંધીજીના વિચારો ટાંકતા વળી તેઓ એવી માન્યતા ધરાવતા કે ખ તેમ જ રાજકીય પ્રવૃત્તિઓ પણ સત્યના નૈતિક ધોરણ અનુસાર થવી જોઈએ.

ગોખલેનાં જીવન અને કાર્યો પર ગાંધીજીની ખૂબ અસર હતી. સ્વદેશી તેમના વિચારો હોય કે દેશભક્તિ અંગેના તેમના વિચારો હોય, ગાંધીજીના વિચારો સંકળાયેલા હોય જ. ગોખલે ગાંધીજીના સમગ્રમમાં સૌપ્રથમ ઈ. સ. ૧૮૯૬માં આવ્યા ત્યાર પછી ભારત અને આફ્રિકામાં અનેક વાર મુલાકાતો યોજાઈ હતી, પરંતુ ઈ. સ. ૧૯ ગાંધીજી તેઓ સાથે કલકત્તામાં એક માસ રહ્યા હતા ત્યારે માલ સંપર્કમાં આવ્યા ગાંધીજીએ પોતાની આત્મકથામાં 'ગોખલે સાથે એક માસ'નાં ત્રણ પ્રકરણોમાં એ સહુ સ્મૃતિઓને શબ્દદેહ આપ્યો છે. ગોખલેની રહેણીકરણી, દેશભક્તિ અને આઝાદીની લડત તમનાએ તેમના માટે આદર જમાવ્યો હતો. ગોખલેને પોતાના રાજકીય યુગુ તરીકે એજાખ ગાંધીજી લખે છે, "રાજકારણના ક્ષેત્રે ગોખલેએ તેમના જીવન દરમિયાન મારા હૃદયમાં આ સ્થાન જમાવ્યું હતું અને આજે પણ મારા હૃદયમાં તેમનું સ્થાન ખરેખર અપ્રતિમ

ગોખલેને પશુ ગાંધીજી માટે આદર અને પ્રેમ હતાં. ઈ. સ. ૧૯૧૫માં મહાત્મા ગાંધી આફ્રિકાથી ભારત પાછા ફર્યા ત્યાર પછી થોડા જ દિવસોમાં ૧૯મી ફેબ્રુઆરીએ ગાંધીજીના હાથમાં ભારતીય સ્વાતંત્ર્યસંગ્રામની લડતનું સુકાન સોંપી ગોખલેએ ચિર વિદાય લીધી. ગોખલેના અકાળ અવસાનથી સમગ્ર એક મહાન સેનાની અને સાચો દેશસેવક ગુમાવ્યો. 'તેમનું હૃદય દેશદાસી સતત ધબકતું હતું અને તેને પરિણામે તેઓ સરીરને જરૂરી આરામ આપી શકેલા નહિ. કેઈ ચિરંજીવ શક્તિથી પ્રેરતું તેઓ કાર્ય કરતા જ રહ્યા અને જ્યારે આ દાની દુનિયા છોડી જવાનો સમય આવ્યો ત્યારે તેઓ કેઈ પશુ જાતનો શોક અનુભવ્યા વિના એક સંતની માફક આંખ મીંચી ગયા હતા.' એમની આ સ્વદેશભક્તિ અને મહાનતાને બિરહાવી અનેક દેશવિદેશી કાર્યકરોએ ભારતમાં અને વિદેશમાં અદાંજલિઓ આપી હતી.

ગાંધીજીએ એમને વિષે કહેલું, "તેમણે જે કંઈ કર્યું, જે કંઈ ભોગવ્યું, અને જેનો ભોગ આપ્યો અમર તો તેમણે જે કંઈ વેઠ્યું તે સર્વ તેમણે માતૃભૂમિને ચરણે જ ધર્યું છે."

લોર્ડ કર્ઝને અંજલિ આપતાં કહેલું :

"I have never met a man of any nationality more gifted with parliamentary capacities. Mr. Gokhale would have obtained a position of distinction in any parliament in the world, even in the British House of Commons, Widely as we differ, I never failed to recognise either his abilities or his high character."

સર વેલેન્ટાઈન ચિરોલ તેમના પુસ્તક 'Fifty Years in a Changing World' માં લખે છે, "Mr. Gokhale who amongst all the Indians I have known seemed to me to combine the finest qualities of the eastern civilization from which he sprang and of the Western civilization of which he had assimilated the best elements."

પંડિત મોતીલાલ નહેરુએ તેમને સ્વદેશભક્તિથી સભર એવા ઉમદા આત્મા તરીકે ઓળખાવતાં કહેલું, "He was a noble soul fired by a patriotism that was all consuming. A born leader of men, he never aspired to anything but to be the humblest servant of the motherland in whose services he brought such devotion into play that it is now a matter of history. He lived upto the very high ideal which he set before himself and his country-men."

અનેક અદાંજલિઓમાંથી આ થોડીક અદાંજલિઓનું સ્મરણ કરી આપણે પશુ એમની જન્મસત્તાબ્દી અસંગે એમને અદાંજલિ અર્પી આવા ભારતરત્ન ભારતની પુરુષભૂમિ પર અવતાર લેવા બદલ ઓરવ અને ધન્યતા અનુભવીએ.

References

1. Chirol : 'Fifty Years in a Changing World'
2. Gandhi, M. K. : 'Gokhale, My Political Guru'
3. Gandhi, M. K. : 'Satyagraha in South Africa'
4. Gandhi, M. K. : 'My Experiments with Truth'
5. Hoyland, J. S. : 'Gopal Krishna Gokhale'
6. Kale, V. G. : 'Gokhale and Economic Reform'
7. Nateson, G. A. & Co. : 'Speeches of Gopal Krishna Gokhale'
(Pub.)
8. Paranjype, R. P. : 'Gopal Krishna Gokhale'
9. Shastri, Shrinivas : 'Gopal Krishna Gokhale'
10. Shastri, Shrinivas : 'My Master Gokhale'
11. Setalvad : 'Reminiscences'
12. Shahani, T. K. : 'Gopal Krishna Gokhale'
13. Sitaramayya Pattabhi : 'The History of Indian National Congress'
14. Wacha, D. E. : 'Reminiscences of the Late Mr. G. K. Gokhale'
15. महात्मा गांधी : 'सत्यना प्रयोगो'.

GOKHALE: THE POLITICAL GURU OF GANDHIJI

(Summary)

It is gratifying to find that our commendable tradition of paying homage to our great men has continued with greater vigour than before especially since we have achieved independence. It was, therefore, in keeping with this tradition that the birth centenary celebrations of the Late Shri Gopal Krishna Gokhale took place on 9th May, 1966 almost in all parts of our country. Here is an attempt to give an account of his life and work.

Gokhale, the son of Shri Krishnarao Gokhale was born in a poor Gokhale family in a village called Kotluk in Chiplun

IDEALISTIC CONCEPT OF METAPHYSICS

HARSIDDH M. JOSHI
Gujarat College, Ahmedabad-6

It is usually remarked that anybody can teach metaphysics. It is reported about a well-known philosopher, the late Prof. D'andrade of the Elphinstone College, Bombay, that he once retorted to such a remark made by somebody: "Yes, but not sense!" In this paper I propose to draw certain implications of the sense of metaphysics and arrive at an attempt to vindicate the case for metaphysics. I am aware of the fact that many such attempts have been made in the past and that they have been strongly refuted by philosophers who disagreed with it. Having kept in view such past efforts and their refutations I shall try to present the whole standpoint in a fresh manner and suggest a new approach to the old problem

Metaphysics and its Definition :

To begin with I would say that man thinks properly and adequately in metaphysics or philosophy alone. This type of metaphysical thinking is one of the inmost values cherished by mankind. But philosophers, however, are not unanimous in thinking this type of defining philosophy. The question as to the nature and definition of philosophy is itself one of the fundamental problems of philosophy. We cannot do without defining philosophy for it is a rational search and like all other inquiries it is in need of a proper definition and subject-matter. I would suggest that this inherent feeling of the problem of definition distinguishes philosophical search from the scientific inquiry.

Unless metaphysics is clearly distinguished from science, metaphysics has no definite province and jurisdiction of its

own. The question of definition is not very serious in the case of science but it is definitely so in the case of metaphysics. One philosopher differs from another philosopher regarding the very definition of philosophy. This, however, is not so in the field of science. The disagreement between an idealist and a positivist is precisely on the ground of the definition of metaphysics.

Consideration of Analytic Movement :

Before I describe as to how idealist defines metaphysics I will consider the merits of its opposition. Firstly the recent analytic movement has rightly insisted upon a sort of vigour and precision in thinking which was quite absent in pre-analytic days. Secondly, it has drawn a pointed attention to the relation between philosophy and language. Now although I do not think that metaphysical problems can be dissolved by linguistic analysis, I do think that some of the problems in metaphysics owe their origin to words and how they are used in language, and that the verbal confusions, if analysed, would lead us to the solution (as opposed to dissolution) of many problems and conflicts in philosophy. I do not think that words such as "absolute" or "timeless" and "spaceless" are meaningless, or when uttered, are simply a noise, an abracadabra. Nor do I think that the sentences containing these words, when rightly analysed, will simply evaporate.

At the same time, however, there are philosophical controversies concerning the antinomies of the Absolute and the relative, the timeless and the time. It is with respect to these controversies that it is very important to clarify the meaning of the words used in the controversies, and to stress the vagueness or meaninglessness of the sentences if and when analysis reveals them. I think the so-called antinomies can be resolved by this method. For instance, it has been held by some that the infinite and the finite are irreconcilable; that the infinite is the ultimate reality, but it cannot be the creator or manifestor of the finite; and finally, that since the finite can in other way be explained, it has to be condemned as

illusory or unreal—and even then, the problem remains as ever unsolved. Now in such a situation, it would be fruitful to analyse the meaning of the word "Infinite". The Infinite need not necessarily mean the negation of the finite; for it may also mean, at least alternatively that it is above the finite but it includes it without being limited by it. The whole process of analysis may be quite long before any satisfactory result is achieved, but it may be sufficient to merely point out here that analysis will reveal that the "metaphysical words" have very often a rich connotation, and if we learn the patience and precision from the analysis, we may be able to come out of the clouds of the words and solve many so-called insoluble metaphysical problems.

But, thirdly, the most important contribution of the analytic movement is its stress on experience. It is true that by experience is usually meant by the adherents of this movement only the sense-experience and this is necessarily a limited view of experience. In fact, Ayer has tended to give a larger scope to the word experience. He says in his essay on 'Verification and experience' that,

"A further point which it is advisable to make clear is that we are not setting any arbitrary boundaries to the field of possible experience. As an illustration of this let us consider the case of the man who claims to have an immediate, non-sensory experience of God. So long as he uses the word 'God' simply as a name for the content of his experience, I have no right to disbelieve him. Not having such experiences myself I cannot understand him fully. I do not myself know what it is like to be acquainted with God. But I can at least understand that he is having some experience of a kind that I do not have. And this I may readily believe."

"I should not be justified in assuming that the sort of experience that I myself had were the only sort that could be had at all. At the same time it must be remarked that 'God' in this usage, can not be the name of the Transcendent

Being, for to say that one was immediately acquainted with a Transcendent Being would be self-contradictory. And though it might be name of a person who in fact endured for ever one could not say one was immediately acquainted with him as enduring for ever. For this too would be self-contradictory." ('Logical Positivism' edited by Ayer, p. 239) On the one hand Ayer grants the possibility of experience on the ground that he does not have it but somebody else may have it and on the other hand when he examines its meaning he calls it contradictory.

It will be obvious that here the charge of self-contradiction is a direct borrowing from the coherence theory which considers. A priori the distinction between present, past and future on the one hand and Eternity on the other hand as a relation of self-contradiction. If in experience we are given eternity and the distinction of past, present, and future simultaneously, however violent this might look to our normal reason based upon ordinary experience we have to admit them as possibility and value as experienced. If empiricism seriously dismisses any other kind of experience, that would be quite arbitrary. Appeal to experience there must be, but it should not be limited to sense experience alone. There are ranges of experience and they cannot be merely brushed aside a priori or merely by the criterion of supposed consistency.

Reality and Meaning of Thinking to its end :

To the question 'what is philosophy' idealist would reply that to know it is itself to become problematic without any datum given from outside. Philosophy means thinking to its end and to deny it is not proper to its own nature. In addition to an appeal of experience, this is a significant indication of the philosophical object. To think to the end is itself a datum not given from outside. To deny this urge to think itself requires a kind of thinking and this precisely indicates the supreme role of reason in the process of philosophising. This is what Bradley meant when he held that to demolish metaphysics requires a brother metaphysician.

There are two prominent meanings of the urge of thinking to the end, one is self-criticism and second meaning is the demand of completeness. In all the branches of knowledge it is philosophy alone which is self-critical. Sciences are self-critical to the extent that they are philosophical. By self-criticism is meant the examination of the modes of cognition by the help of which one endeavours to grasp the philosophical object. What do we do when we actually philosophise? Such an observation of the procedure of philosophising is done in philosophy alone. Thus we read the object of philosophy by analysis and criticism. It gradually becomes more and more a clear and explicit as we advance in the cognitive process.

There is still another meaning of urge of thinking to the end, It is the demand of completeness. Reason provide us with the principles of non-contradiction and all-comprehensiveness. It is the demand of thought to be self-sufficient and complete in the absence of which it would remain hypothetical and not inevitable for human awareness. Owing to this urge of thinking we find the Ontological argument persisting throughout the centuries in modern philosophy.

It is objected at times that in such an argument there is an unwarrantable transition from what is a demand of thought or a characteristic manner of thinking, that is thinking without assumptions, to existence of something other than thought having the quality of completeness. Idealist would reply to this objection that if from the urge of thinking it is not at all possible to reach Reality there is bound to remain an unbridgeable gulf between thought and Reality. If what we think is no indication of what is to be it is to invite scepticism is one way or another. An absolute distrust of thought is self-destructive.

If thought is the index of Reality it is because Reality in itself is complete. If Reality were incomplete how could thought in grasping such a fragmentary existence obtain internal completeness? In this sense Reality or Infinite is not something that

we assume or take it for granted nor is it a hypothesis whose truth may or may not be verified by philosophical reflection. If thought denies Reality it destroys itself.

To the question as to why we think in this manner it would be held that thinking gives us validity and this is determined by valuation. It is value which determines validity and it is validity which determines Reality.

Thus idealistic concept of metaphysics can be understood from the points of view of experience as well as thought. Philosophy or metaphysics is itself an extraordinary process of defining its own province by the act of which it is distinguished from science. Its subject-matter is found in searching out the implications of several propositions which we make in thinking out the object of philosophy. Appeal to experience is part of its search. Its validity is shown by the nature of thinking to the end.*

* Paper read at the 39th Session of Indian Philosophical Congress held at Delhi, 26-29, Dec. 1965.

અમદાવાદ મધ્યસ્થ જેલમાં પરિવર્તન—એક અધ્યયન

શ્રી. હસમુખભાઈ હ. પટેલ, એમ.એ. (સમાજશાસ્ત્ર)

આપ્તતા, શ્રી. હ. કા. આર્ટ્સ કોલેજ, અમદાવાદ

[“વિદ્યા” ઓગસ્ટ, ૧૯૬૫ના અનુસંધાનમાં ચાલુ—]

જેલ-પરિવર્તનનો હાલનો તબક્કો

અમદાવાદ મધ્યસ્થ જેલમાં આવેલું પરિવર્તન અથવા તેનું પરિવર્તિત સ્વરૂપ કયા તબક્કામાં પહોંચ્યું છે તે, તેમાં આવેલી સ્થિરતા(stability)ને આધારે તારવવાને આપણે અહીં પ્રયત્ન કરીશું. તેની સ્થિરતાને સ્પષ્ટ સ્વરૂપે અને સરળ રીતે સમજાવવા માટે તેને આપણે ત્રણ વિભાગમાં તપાસીશું:

૧. અમલદારો અને કેદીઓ કેટલે અંશે નવીન મૂલ્યો અને ધોરણો આત્મસાત્ કરી શક્યા છે?

૨. આ જેલના રચનાતંત્રની અંગભૂત પ્રવૃત્તિઓ, સગવડો અને પદ્ધતિઓમાં નવીન મૂલ્યો અને ધોરણોની એકરૂપતા

૩. પરિવર્તનનાં દિશા, ગતિ, માત્રા

૧. કેદીઓ અને અમલદારોમાં નવીન મૂલ્યો અને ધોરણોની આત્મસાત્તા

કેદીઓ અને અમલદારો નવીન જેલપદ્ધતિના ધ્યેયને જેટલે અંશે અપનાવે તથા નવીન મૂલ્યો અને ધોરણોને જેટલે અંશે આત્મસાત્ કરે તેટલે અંશે પોતપોતાની ભૂમિકાઓ યથાર્થ સ્વરૂપે અદા કરી શકે. અને તો જ તેમની ભૂમિકાઓ સાથે સંકળાયેલી પ્રવૃત્તિઓ અને પદ્ધતિઓ નવીન મૂલ્યોને અનુરૂપ અને ધ્યેયલક્ષી બને. અને જેટલે અંશે જેલના રચનાતંત્રની અંગભૂત વ્યક્તિઓ અને પદ્ધતિઓમાં નવીન મૂલ્યો અને ધોરણો જેટલે અંશે એકરૂપ થઈ જાય તેટલે અંશે સમગ્ર જેલસંસ્થા પોતાનું કાર્ય (function) વધુ યથાર્થ સ્વરૂપે કરી શકે. આ દૃષ્ટિએ આ જેલના રચનાતંત્રની અંગભૂત વ્યક્તિઓ—કેદીઓ અને અમલદારો—નવીન જેલપદ્ધતિના ધ્યેયને અપનાવી તથા નવીન મૂલ્યોને કેટલે અંશે આત્મસાત્ કરી શક્યા છે તે આપણે અહીં તપાસવા પ્રયત્ન કરીશું. નવીન જેલપદ્ધતિને અનુલક્ષીને તેમનાં આધુનિક (non-traditional) અને જૂનવાણી (traditional) વલણોની તારવણી દર્શાવતા નીચેના કોઠા ઉપરથી ઉપરોક્ત બાબત સહેજે સમજી શકાશે:

વલણ	કેદીઓ (કોઠા)	અમલદારો (કોઠા)
સર્વાંશે આધુનિક વલણ	—	—
મહદ્ અંશે આધુનિક વલણ	૫૦	૭૦

વર્ણન	કેદીઓ (કક્કા)	અમલદારો (કક્કા)
થોડે અંશે આધુનિક અને થોડે અંશે જુનવાણી વલણ	૫૦	૩૦
મહદ્ અંશે જુનવાણી વલણ	—	—
સર્વાંશે જુનવાણી વલણ	—	—

આ કોઠામાં પણ જોઈ શકાય છે કે સર્વાંશે કે મહદ્ અંશે જુનવાણી વલણ કોઈ પણ કેદી કે અમલદાર ધરાવતા નથી. જ્યારે ઘણા મોટા ભાગના અમલદારો અને અર્ધા ભાગના કેદીઓ તો મહદ્ અંશે આધુનિક (non-traditional) વલણ ધરાવે છે. એટલે કે આ અમલદારો અને કેદીઓએ નવીન જ્ઞેષપદ્ધતિનાં ખ્યેય, મૂલ્યો અને ધોરણો સ્વીકાર્યાં અને અપનાવ્યાં છે એટલું જ નહિ, પરંતુ તેઓ ધણાંખરાં નવીન મૂલ્યો અને ધોરણોને ધણે અંશે આત્મસાત્ પણ કરી શક્યા છે. અને આ જ્ઞેષના પરિવર્તિત સ્વરૂપની નવીન પ્રવૃત્તિઓ અને પદ્ધતિઓને જ્ઞેષના નવીન ખ્યેય, મૂલ્યો અને ધોરણોના સંદર્ભમાં જ મહદ્ અંશે ધટાવે છે એમ અવશ્ય કહી શકાય. બાકીના અદ્ય ભાગના અમલદારો અને અર્ધા ભાગના કેદીઓમાં પણ થોડે અંશે તો આધુનિક વલણ ધકાડ્યું છે. નવીન મૂલ્યો અને ધોરણો થોડે અંશે તો આત્મસાત્ થઈ જ શક્યાં છે. જોકે જ્ઞેષની અંગભૂત જેટલી વ્યક્તિઓમાં જે થોડે અંશે જુનવાણી (traditional) વલણ જણાય છે તેટલે અંશે પરિવર્તન અપૂર્ણ અને ઓછું સ્થિર છે એમ જરૂર કહી શકાય. પરંતુ સર્વાંશે અને મહદ્ અંશે જુનવાણી વલણ ધરાવનાર તો કોઈ નથી. અને થોડે અંશે જુનવાણી વલણ ધરાવનારા પણ વધુ નથી બલકે થોડા છે. અને તે થોડામાં પણ થોડે અંશે તો આધુનિક વલણ પડેલું જ છે. એટલે સમગ્ર દષ્ટિએ આ કોઠા પરથી એમ સહેજે તારવી શકાય કે એકંદરે આધુનિક વલણ ઓછેવતે અંશે તો તમામ કેદીઓ અને અમલદારો ધરાવે છે, અને પ્રમાણની દષ્ટિએ આધુનિક વલણનું પ્રમાણ જુનવાણી વલણ કરતાં નેધિપાત્ર એટલું વધારે છે એમ સહેજે કહી શકાય. આ હકીકતને ધ્યાનમાં લેતાં એમ સહેજે કહી શકાય કે વધુ ને વધુ વ્યક્તિઓમાં આધુનિક વલણ વધુ ને વધુ સ્થિર થતું જાય છે. પરિવર્તનની આધુનિકતા (non-traditionality) તરફની પ્રતિ રુપ રીતે જોઈ શકાય છે. જ્ઞેષના રચનાતંત્ર (structure)ની અંગભૂત વ્યક્તિઓએ નવીન મૂલ્યો અને ધોરણો સાથે સાધેલી આત્મસાતતાની દષ્ટિએ જોઈએ તો એમ અવશ્ય કહી શકાય કે આ જ્ઞેષમાંનું પરિવર્તન તીવ્ર સંઘર્ષયુક્ત સંક્રાંતિકાળ પાર કરી ધણે અંશે સ્થિર થઈ શક્યું છે.

૨. આ જ્ઞેષની પ્રવૃત્તિઓ, સગવડો અને પદ્ધતિઓમાં નવીન મૂલ્યો અને ધોરણોની એકરૂપતા

આ જ્ઞેષમાં અપનાવાયેલી સંગીત, નૃત્ય અને ચિત્રકામ જેવી સારક્રુતિક પ્રવૃત્તિઓ; રક્તદાન, બ્રોઈલ લિપિ જેવી માનવતાપ્રેરક પ્રવૃત્તિઓ; ફરલો, પેરોલ તથા શૈક્ષણિક સગવડો જેવી વિવિધ સગવડો; વિવિધ ઉદ્યોગો અને વળતર પદ્ધતિ વગેરે તો નવીન જ્ઞેષપદ્ધતિનો જ સીધો પરિપાક છે. જ્ઞેષમાંની સળપદ્ધતિ પણ અગાઉની સરખામણીમાં હળવી અને નવીન

સ્વરૂપની બનાવવામાં આવી છે. સમગ્ર ૯૦ ટકા ઉપરાંત કેદીઓ અને અમલદારોએ નવીન ખેત, મૂંધો અને ધોરણોને અનુલક્ષીને જેલના હાલના સ્વરૂપમાં ગૂંથાયેલી ઉપરોક્ત વિવિધ પ્રવૃત્તિઓ, સગવડો અને પદ્ધતિઓને આવશ્યક માની સ્વીકારી અને મહદ્ અંશે અપનાવી છે. વિવિધ પ્રવૃત્તિઓ, પદ્ધતિઓ અને સગવડો જેમાં શુદ્ધિ છે એવા આ જેલના હાલના સમગ્ર સ્વરૂપ અંગેના અમલદારો તથા કેદીઓનાં સંતોષ-અસંતોષભર્યાં વલણો નીચેના કોઠા મુજબ જણાયાં છે :

હાલમાં પ્રવર્તમાન સ્વરૂપ પ્રત્યેનું વલણ	કેદીઓ (૮૬૧)	અમલદારો (૮૬૧)
સર્વાંશે સંતોષભર્યું	૭.૫	—
મહદ્ અંશે સંતોષભર્યું	૬૫.૦	૪૦
થોડે અંશે સંતોષભર્યું અને થોડે અંશે અસંતોષભર્યું	૨૨.૫	૩૦
મહદ્ અંશે અસંતોષભર્યું	૫.૦	૩૦
સર્વાંશે અસંતોષભર્યું	—	—

આ કોઠા ઉપરથી એમ તારવી શકાય કે આ જેલના હાલમાં પ્રવર્તમાન પરિવર્તિત સ્વરૂપ અંગે કેદીઓ અને અમલદારોમાં સંતોષનું પ્રમાણ કંઈક વધુ છે. અમલદારો અને કેદીઓમાં નોંધપાત્ર નવીન મૂંધો નોંધપાત્ર અંશે આત્મસાત થયેલાં છે. તે આપણે અગાઉ અર્પી ગયા છીએ. એટલે એમ સહેજે કહી શકાય કે આ જેલનું પ્રવર્તમાન પરિવર્તિત સ્વરૂપ કેદીઓ અને અમલદારોએ સ્વીકારેલાં, નવીન મૂંધો પર આધારિત એવાં તેમનાં ધોરણો કંઈક વધુ અંશે સંતોષી શકે છે. એટલે અંશે સમગ્ર સ્વરૂપે આ જેલનું હાલનું સ્વરૂપ નવીન મૂંધોને અપનાવી શક્યું છે. અને એટલે અંશે આ જેલનું સ્વરૂપ નવીન જેલપદ્ધતિના ખેતને અનુસરનારું છે. બીજી રીતે કહીએ તો આ જેલનું પ્રવર્તમાન સમગ્ર રચનાતંત્ર અને તેનાં અંગભૂત તત્ત્વો ખેત અનુસાર પોતાનું કાર્ય (function) કંઈક નોંધપાત્ર અંશે યથાર્થ સ્વરૂપે કરે છે. પરંતુ અસંતોષનું પ્રમાણ પણ ઉપેક્ષા ધર્મ શકે તેટલું અદ્ય નથી. નોંધપાત્ર પ્રમાણમાં કેદીઓ અને અમલદારો ઓછેવત્ અંશે અસંતોષ દર્શાવે છે. સર્વાંશે અસંતોષ કોઈ ધરાવતું નથી પરંતુ સાથે સર્વાંશે સંતોષ ધરાવનારાઓનું પ્રમાણ પણ નાનું છે. આમ અસંતોષનું પ્રમાણ સંતોષના પ્રમાણ કરતાં ઓછું છતાં ખ્યાન ખેતે તેટલું જરૂર છે. પરંતુ આ જેલના હાલમાં પ્રવર્તમાન સ્વરૂપ પ્રત્યેના અસંતોષ જનવાણી વલણ કે જૂની જેલપદ્ધતિને પોષક નથી બલકે જેલના હાલમાં પ્રવર્તમાન સ્વરૂપમાં ગૂંથાયેલી પ્રવૃત્તિઓ, પદ્ધતિઓ અને સગવડોમાં નવીન મૂંધો અને ધોરણો અપનાવાયાં હોવા છતાં તેમાં રહી ગયેલી કચાર તથા ટુટીઓ તેમના આ અસંતોષ માટે મહદ્ અંશે જવાબદાર છે. એટલે કે તેમના મોટા ભાગનો અસંતોષ પણ ખેતલક્ષી અને ખેતપોષક છે. એટલે કે એટલે અંશે આ જેલનું રચનાતંત્ર (structure) અને તેનાં અંગભૂત તત્ત્વો નવીન ખેત અને મૂંધો તરફ પ્રતિશીલ હોવા છતાં તેમાં ખ્યાન ખેતે તેવાં અવરોધક પરિબલો પણ હયાતી ધરાવે છે. પરિણામે એટલે અંશે જેલ-પરિ-

વર્તમાની સ્થિતિમાં અને ગતિ જોખમાય છે એ સાચું, પરંતુ કેદીઓ અને અમલદારોના સંતોષભર્યા વલણનું પ્રભાવ અસંતોષભર્યા વલણના પ્રભાવ કરતાં ઠીક ઠીક વધારે હોવાથી એમ કહી શકાય કે નવીન ખ્યેય, મૂલ્યો અને ધોરણો આ જેલના હાલના પરિવર્તિત સ્વરૂપમાં નોંધપાત્ર અંશે સુસંગઠિત રીતે ગૂંથાયાં છે—ગૂંથાતાં જાય છે. એટલે કે આ જેલમાં નવીન પરિવર્તિત સ્વરૂપ અવરોધોને સંપૂર્ણ રીતે પાર નથી કરી શક્યું એ ખરું, પરંતુ મુખ્ય અવરોધોને ઠીક ઠીક અંશે વટાવીને સતત અને સખત ધપાવોનો સહિષ્ણ સંક્રાંતિકાળનો તબક્કો તો પાર કરી સ્થિરતાની પાસે ઠીક ઠીક મળવા માંડી ચૂક્યું છે.

આમ કેદીઓ અને અમલદારોનો સંતોષ તો ખ્યેયલક્ષી છે જ પરંતુ તેમનો ધણોખરો અસંતોષ પણ નવીન ખ્યેય અને મૂલ્યોને—પરિવર્તનને પોષક અને સહાયક છે. આ બાબત ખતાવે છે કે વધુ પરિવર્તન માટેની અનુકૂળ એવી પશ્ચાદ્ભૂમિકા પણ ધણે અંશે તૈયાર છે.

૩. પરિવર્તનની દિશા, ગતિ અને માત્રા

જેલના પરિવર્તિત સ્વરૂપમાં યુક્તિ વિવિધ પ્રવૃત્તિઓ, પદ્ધતિઓ અને સમવડો જોતાં એક બાબત તો ખૂબ સ્પષ્ટ રીતે તરી આવે છે કે એ બધાનો મુખ્ય હેતુ નવીન જેલ-પદ્ધતિનાં ખ્યેય અને મૂલ્યોને ઓછેવત્ અંશે પ્રતિબિંબિત કરવાનો છે. તેમનાં કાર્યો (functions) નવીન જેલપદ્ધતિને ઓછેવત્ અંશે સહાયરૂપ થાય છે એ લગભગ ૮૦ ટકા કેદીઓ અને ૬૦ ટકા અમલદારો સ્વીકારે છે. એટલે સહેજે એમ કહી શકાય કે આ જેલમાં સ્વીકારાયેલા નવીન ખ્યેયની દિશામાં આ જેલમાં થતું પરિવર્તન સતત ગતિશીલ છે.

ગતિની દૃષ્ટિએ આ પરિવર્તનને તપાસીએ બ્રિટિશ રાજ્યકાળ દરમિયાન જેલપરિવર્તનના ૧૧૨ વર્ષના (ઈ. સ. ૧૮૩૫થી ઈ. સ. ૧૯૪૭) ગાળામાં જેટલું પરિવર્તન આ જેલમાં આવ્યું હતું તેના કરતાં ૧૯૪૭થી સ્વાતંત્ર્યપ્રાપ્તિ પછીના ૧૭-૧૮ વર્ષના ગાળામાં આવેલું પરિવર્તન એકંદરે ઘણું વેગીલું કહી શકાય. અગાઉ દર્શાવાયેલી તમામ વિગતો આ બાબતની શાખ પૂરે છે.

જેલનાં ખ્યેય, મૂલ્યો અને ધોરણો; જેલનું કાર્ય; તેનું રચનાતંત્ર તથા તેના અંગરૂપ વિવિધ પ્રવૃત્તિઓ, પદ્ધતિઓ અને તે પાછળની દૃષ્ટિ; કેદીઓ અને અમલદારોની ભૂમિકાઓ (roles) તથા તેમની વચ્ચેના સંબંધો વગેરે તમામ પાસાંઓમાં વૈચારિક અથવા સૈદ્ધાંતિક તથા પ્રત્યક્ષ—અને દૃષ્ટિએ સ્વાતંત્ર્યપ્રાપ્તિ પહેલાંના સ્વરૂપ કરતાં આ જેલના હાલના સ્વરૂપમાં ઘણા નોંધપાત્ર પ્રમાણમાં પરિવર્તન આવ્યું છે આ જ બાબત આ જેલમાંની વિવિધ પ્રવૃત્તિઓ, પદ્ધતિઓ અને સમવડો તથા તે પ્રત્યેના કેદીઓ તથા અમલદારોનાં વલણો તપાસતાં પણ તરી આવે છે. કેદીઓ અને અમલદારોમાં એકંદરે ઠીક ઠીક વધુ પ્રમાણમાં પ્રવર્તતી આધુનિકતા (non-traditionality) અને આ જેલના હાલના સમગ્ર સ્વરૂપ પ્રત્યેનાં તેમનાં વલણો તથા તે પાછળનાં કારણો વગેરે બાબતો પણ ઉપરોક્ત બાબતનું જ સમર્થન કરે છે ટૂંકમાં, આ જેલના અગાઉના (૧૯૪૭ પહેલાંના) સ્વરૂપ કરતાં તેના હાલના સ્વરૂપમાં ઘણા વિસ્તારમાં (અનેકવિધ પાસાંઓની દૃષ્ટિએ) બ્યાન જોએ એટલી વધુ માત્રામાં પરિવર્તન આવ્યું છે. આ પરિવર્તનનું પ્રમાણ નિશ્ચિત માપમાં અને

તમા અધ્યાત્મિક દર્શાવી શકાય તેમ નથી એ સાચું, પરંતુ આ જેલના અમાઝી સ્વરૂપની નામાં આ જેલના સમગ્ર સ્વરૂપમાં મૂળભૂત રીતે અને ઘણાં પાસાંઓમાં એકંદરે ઘણી માંમાં પરિવર્તન આવ્યું છે એમ સ્પષ્ટ રીતે સહેજે તારવી તો શકાય જ છે.

આમ ઉપરોક્ત ત્રણે બાબતો તપાસતાં સ્પષ્ટ રીતે એટલું તો તારવી શકાય છે કે આ ક્ષત્રી પ્રવર્તમાન સમગ્ર પરિવર્તિત સ્વરૂપ સતત અને સખત ધર્મોલોવાળો સંક્રાંતિકાળ વટાવી અંશે સ્થિર થઈ શક્યું છે. અવરોધક બળો હયાતી ધરાવે છે એટલે અંશે પરિવર્તનની નીન ધ્યેયલક્ષી ગતિમાં શિથિલતા જરૂર આવે છે. આમ સંપૂર્ણ સ્થિરતા આવી શકી નથી. પરંતુ અવરોધક બળો નવીન ધ્યેયલક્ષી જેલ-પરિવર્તનને પાછું ધકેલી કે સ્થગિત કરી શકે વાં પ્રયત્ન રહ્યાં નથી. એટલે નિઃશંકપણે એમ કહી શકાય કે આ જેલમાં આવેલું જેલ-પરિવર્તન સંક્રાંતિકાળનો તબક્કો પાર કરી સ્થિરતાના તબક્કાની ધણી મળજી કાપી શક્યું છે.

પસંહાર

આમ સમગ્ર દૃષ્ટિએ જેલમાં એમ તારવી શકાય કે અમલદાર મધ્યસ્થ જેલમાં જેલ-પરિવર્તન નિશ્ચિત ધ્યેયની દિશામાં આગળ વધે છે. જેલ-પરિવર્તનનાં પ્રમાણ, વિસ્તાર અને યલક્ષી ગતિ નોંધપાત્ર પ્રમાણમાં વધ્યાં છે, પરંતુ ધ્યેય સર્વાંશે સિદ્ધ થઈ શક્યું નથી. ૭ ધ્યેયલક્ષી પરિવર્તનને સારો એવો અવકાશ છે. આવેલા પરિવર્તનમાં સ્થિરતા જરૂર પડી છે પરંતુ સંપૂર્ણ સ્થિરતા આવી શકી નથી. આધુનિક જેલ-પદ્ધતિના સખળ સહાયક રાખળ તરીકે ભારતનું રાજકીય સ્વાતંત્ર્ય; લોકશાહી વિચારસરણી; રાજકીય, આર્થિક ને સામાજિક ન્યાયની ભૂમિકા પર રમાયેલું પ્રજાસત્તાક બિનસાંપ્રદાયિક રાજ્યપંથારણ; માનમાં વધતું જતું વૈજ્ઞાનિક વલણ; માનવીય સામાજિક મૂલ્યોનું પ્રસ્થાપન; દુનિયામાં ને દેશમાં નવીન જેલ-પદ્ધતિના વિવિધ સહળ પ્રયોગો વગેરે પ્રત્યાપિત થઈ શક્યાં છે. ૮મ નવીન ધ્યેયલક્ષી જેલ-પરિવર્તનનાં સહાયક પરિબળો વધ્યાં છે અને તે વધુ સખળ પથ યાં છે. વળી આ જેલના રચનાતંત્રના અગ્રભૂત કેદીઓ અને અમલદારોમાં નવીન ધ્યેયને પનાવનારાઓનું પ્રમાણ ઘણું મોટું જેવા મળે છે. તેઓમાં વધુ ને વધુ નવાં મૂલ્યો વધુ ને પ્રમાણમાં આતમસાત્ થતાં જાય છે. એટલે એમ કહી શકાય કે આ જેલનું પરિવર્તન ૮ નવીન ધ્યેયની દિશામાં વધુ ને વધુ ગતિ કરતું જશે અને વધુ ને વધુ સ્થિર થતું જશે.

પરંતુ કેટલાક અમલદારો અને કેદીઓમાં કેટલેક અંશે જૂની જેલપદ્ધતિ તરફ ત્રાણી (traditional) વલણ હજી પ્રવર્તે છે. આ જેલના સમગ્ર સ્વરૂપ પ્રત્યે સંતોષ-પ્રતોષનો કોઠો જેલમાં એમ પથ તારવી શકાય છે કે આ જેલમાંની પ્રવૃત્તિઓ અને પ્રવૃત્તિઓ નવીન મૂલ્યોની દૃષ્ટિએ જેલમાં પૂરતી લાગતી નથી તથા નવીન મૂલ્યો સાથે ન પૂરતા પ્રમાણમાં એકરૂપ થઈ શકી નથી. હજી કેટલાક કેદીઓ અને નીચલી કક્ષાના લોક અમલદારોમાં નવીન મૂલ્યો, ધોરણો અને ધ્યેય પ્રત્યેનો સહાનુભૂતિ અવપાશ કે માવ, અપૂરતો સ્પર્શ, કેદીઓમાં અક્ષરજ્ઞાનનું અવપ પ્રમાણ, જટિલ સરકારી તંત્રમાં નવીન પ્રવૃત્તિની જરૂરિયાતો માટે સેવાતી બેદરકારી અને વિલંબનીતિ, નાનામોટા અમલદારો માટે ન ધ્યેયને અનુરૂપ એવી જરૂરી તાલીમની અવસ્થાની અપૂરતી અને અવપ જેલનાઈ,

અમલદારોની જવાબદારી અને કામના પ્રમાણમાં અલ્પ પમારોત્ક્રમ વગેરે નવીન ખેતલક્ષી પરિવર્તનનાં અવરોધક પરિબલો આ જેલના પરિવર્તનની ગતિમાત્રાને હજી પણ અવરોધી રહ્યાં છે. રાજકીય પરિવર્તનને જેવું પરિવર્તનને લક્ષ્ય સ્થગિત કરી દેનારું અત્યંત પ્રબળ અવરોધક પરિબલ દૂર થઈ શક્યું છે એ સાચું, પરંતુ ઉપરોક્ત પરિબલોમાંનાં કેટલાંક વધુ અવરોધ પેદા કરનારાં પરિબલો હજી આ જેલમાંથી ધણે અંશે દૂર થઈ શક્યાં નથી એ પણ એટલી જ સાત્ત હકીકત છે. જોકે આમ છતાં પરિવર્તનનાં સહાયક પરિબલોની પ્રબળતાની તુલનામાં અવરોધક પરિબલોની પ્રબળતા એવી નથી રહી, કે જે નવીન ખેતલક્ષી જેલપરિવર્તનને થંભાવી કે પાછું ધકેલી દઈ શકે. અને સમગ્ર દૃષ્ટિએ વિચારતાં એમ પણ કહી શકાય કે આ અવરોધક પરિબલોને નિર્બળ કરી કે દૂર કરી થતા પરિવર્તનની ગતિમાત્રામાં વૃદ્ધિને હજી ધણો અવકાશ છે. વળી જ્યાં સુધી જૂનાં અને નવાં બંને પ્રકારનાં મૂલ્યો અમલદારો અને કેદીઓમાં ઓછેવત્ અંશે અસ્તિત્વ ધરાવે છે ત્યાં સુધી વ્યક્તિ-વ્યક્તિઓ વચ્ચે જૂનાં-નવાં મૂલ્યો પર આધારિત ધર્ષણો ઓછેવત્ અંશે થતાં જ રહે એ સ્વાભાવિક છે. પરિણામે એ ધર્ષણોના પ્રમાણમાં ભૂમિકાત્મક સંઘર્ષ (role-conflict) પણ થતો રહેશે એ સહેજે સમજી શકાય તેમ છે. વળી થોડે થોડે અંશે જૂનાં અને નવાં બંને પ્રકારનાં મૂલ્યો ધરાવનારા કેદીઓ અને અમલદારોમાં વ્યક્તિગત રીતે પોતાનામાં પણ નવાં-જૂનાં મૂલ્યો અને ધોરણોનું દંડયુદ્ધ થતું રહેશે એમ પણ સહજ તારવી શકાય. પરિણામે ધર્ષણ વેળા આવા કેદીઓ અને અમલદારો દ્વિધા અનુભવે અને નવાં મૂલ્યો, ધોરણો તથા ખેતલક્ષી સર્વાંશે તેમના હાઈ સાથે તેને સમજી અને અપનાવી શકે નહિ તે સમજી શકાય તેવી બાબત છે. પરંતુ અગાઉ જેવું તેમ, મોટા ભાગના અમલદારો અને કેદીઓ ધણે અંશે નવીન મૂલ્યો અને ધોરણો આત્મસાત્ કરી શક્યા છે. તેથી ઉપરોક્ત બંને પ્રકારના સંઘર્ષોનું પ્રમાણ એકંદરે ઠીક ઠીક ઓછું રહેશે એમ કહી શકાય. એટલે જેલ-પરિવર્તનનાં બંને પાસાં જોતાં એમ સહેજે તારવી શકાય કે આ જેલમાં નવીન જેલ-પદ્ધતિનું ખેતલક્ષી બલિષ્ઠતા પરિપૂર્ણ થઈ શકે તેમ નથી. તેમ છતાં સમગ્ર દૃષ્ટિએ જોતાં એમ અવશ્ય અનુમાની શકાય કે બાહ્ય સમાજના સામાજિક પરિવર્તનની સાથે સાથે જ આ જેલનું પરિવર્તન તેના નવીન ખેતલક્ષી દિશામાં જ — ખેતલક્ષી પ્રાપ્તિ તરફ જ — પ્રગતિ સાધતું રહેશે.

ટૂંકમાં, નવીન જેલપદ્ધતિનાં મૂલ્યો અનુસાર કેદીને પણ સામાજિક સંબંધોથી વીંટળાયેલા અને સામાજિક દરજ્જે તથા ભૂમિકાઓ (social status and roles) ધરાવતા સામાજિક અનુભવ તરીકે સમાજ હવે સ્વીકારે છે. આ જ પાયા પર આ જેલનાં ખેતલક્ષી, મૂલ્યો અને ધોરણો મહદ્ અંશે પ્રસ્થાપિત થયેલાં છે. આ નવીન ખેતલક્ષી અને મૂલ્યોને અનુરૂપ આનુષંગિક નવીન પ્રવૃત્તિઓ, પદ્ધતિઓ, સગવડો, ભૂમિકાઓ અને ધોરણોની સુલ્લવાદી ગંજણી આ જેલના રચનાતંત્રમાં વધુ ને વધુ થતી જાય છે. પરિવર્તનનાં સહાયક પરિબલો અને તેમની પ્રબળતામાં નોંધપાત્ર વધારો થયો છે. અને સાથે સાથે જ પરિવર્તનને અવરોધક પરિબલો અને તેમની પ્રબળતામાં નોંધપાત્ર ઘટાડો થયો છે — થતો જાય છે. બીજી રીતે કહીએ તો બાહ્ય સમાજના પરિવર્તનની સાથે સાથે સામાજિક સંસ્કારો આ જેલમાં પણ સામાજિક અને માનવીય દૃષ્ટિબિંદુવાળી ભાત (pattern)ની જેલ-પદ્ધતિ વિકસતી — સ્પષ્ટ સ્વરૂપ લેતી જતી — દેખાય છે.

Summary

The present study intends to explore the role-relationships between the prisoners and prison officials and their attitudes towards the new prison system. The study is based on the enquiry conducted at Ahmedabad Central Prison in the year 1962-'63. The prisoners who are under five years' or more imprisonment were selected for the study at regular interval. Likewise the prison officials were selected on the basis of the nature of their contact with the prisoners.

In the light of the findings of the enquiry, it may be sum up that both the groups i.e. prisoners and officials accept the reformatory and rehabilitative methods instituted in the new prison system instead of traditional retributive punitive system. This has resulted into conformity with the new policy which holds that prisoners deserve tolerance and sympathy as their crime is a diseased behaviour, which requires to be diagnosed rather than punished. The officials help the prisoners to make use of various newly emerged facilities such as medical care, facilities related to bath, toil, and refreshment, recreational equipments and group forming. Officials also make it possible to develop prisoners' interest in painting, sculpture, carpentry, pottery and various cultural activities, which include folk-dances, drama and music. They are also given the necessary opportunity to educate and pass various examinations. As prisoners take part in productive activities they produce various useful things and in return they are given a remuneration.

All this has created a situation in which the prisoners and the officials who are in direct contact with the prisoners, do not look towards each other with the eye of envy and prejudice. Rather it has created a situation in which the officials help the prisoners to help themselves, so that when they are released they can lead a respectable life. And the prisoners also look towards the officials as their real guide who are for their

betterment rather than to abuse, exploit or punish them as it was in the past.

Statistically it is possible to state that more than 80% of the officials and the prisoners have accepted the modern attitude of reformative and rehabilitative treatment and have implemented it in the practice. However, administrative approach to the implementation of new policies brings a partly dissatisfaction to remaining others.

વિધેય

સી. જી. વાલેસ

સેન્ટ એલિસ કોલેજ

અમદાવાદ-૬

૧.૧. વિધેયનો ખ્યાલ

મણિતમાં — અને જીવનમાં — વિધેયનો ઉપયોગ રોજ રોજ આપણે કરીએ છીએ... તેનું નામ જ આપણે જાણતા ન હોઈએ તોપણ. આપણે થોડા પત્રો લખીને દરેક તેના પરખીડિયામાં મૂકીએ; કે બેખીનું વજન અઠવાડિયે અઠવાડિયે માપીને નોંધી રાખીએ; કે મહેમાનોની સંખ્યાનો અંદાજ કાઢીને ભોજનસમારંભની વ્યવસ્થા કરીએ ત્યારે, આપણને વિધેય વિશે ધીર અજ્ઞાન હોય તોપણ, તેનો ગુપ્ત ઉપયોગ આપણે કરી રહ્યા છીએ. સામાન્ય રીતે બે વસ્તુઓના સંબંધ (પત્રો ને પરખીડિયાં, વજન ને તારીખ, મહેમાનો ને બેઠકો — કે લાડુઓ!) —ની વચ્ચે મેળ બેસાડવાનો હોય ત્યારે વિધેય ડોકિયું કરે છે. મણિતની ભાષામાં કહીએ તો ‘સંખ્યાઓ’ના બે ‘મણ’ વચ્ચે ‘સંબંધ’ની વાત આવે તો એના મૂળમાં ‘વિધેય’ હોય છે. જરા જાહેર બિતરવા માંડીએ.

દસ પત્રો લખ્યા. સરનામાવાળાં દસે પરખીડિયાં પણ તૈયાર કરી રાખ્યાં. હવે દરેક કાગળ પોતાના જ પરખીડિયામાં જાય એટલી જ કાળજી રાખવાની. આમ ત્રણ વાત યર્ષ: એક, પત્રોનો મણ; બીજી, પરખીડિયાનો મણ; ત્રીજી, પત્રોને પરખીડિયામાં મૂકવા માટે નિયમ (રમેશભાઈ ઉપરનો કાગળ રમેશભાઈને જ મળે, નહિ કે ગણેશભાઈને) એ નિયમ અનુસાર પહેલા મણની વસ્તુઓ બીજા મણની વસ્તુઓની સાથે સંકળાઈ જાય. કયો પત્ર કયાં મળે એ આપણે જાણી શકીએ છીએ. આ ત્રણ બાબતો — બે મણ અને નિયમ — લઈને વિધેયનો ચોક્કસ ખ્યાલ આપણે મેળવી શકીશું.

એક માણિતિક કાગળો લઈએ. ચોરસની બાજુ ઉપરથી તેનું ક્ષેત્રફળ શોધવા માટેનો નિયમ તો આપણે જાણીએ છીએ. બાજુ a હોય તો ક્ષેત્રફળ a^2 થાય. અહીં પહેલો મણ અમુક ચોરસોની બાજુઓ, બીજો મણ તેમનાં ક્ષેત્રફળ, અને એકમાંથી બીજા ઉપર જવાનો નિયમ ‘ a નું a^2 થાય’ એ છે. આમ વિધેયના ત્રણ મુદ્દાઓ આવી જાય છે.

૧.૨. પ્રદેશ ને વિસ્તાર

આ સામાન્ય ખ્યાલને શાસ્ત્રશુદ્ધ સ્વરૂપ આપવા થોડી પરિભાષા ને સંજ્ઞાઓ જોઈશે. (બજારની વાતો પોતાના માર્ગિક સંકેતોમાં નાખે તો જ મણિતવાળાને એન પડે ને!) વસ્તુઓનો પહેલો મણ વિધેયનો પ્રદેશ (Domain) જ્યારે બીજો મણ વિધેયનો વિસ્તાર (Range) કહેવાય છે. પત્ર-પરખીડિયાના ઉદાહરણમાં દસ પત્રો ‘પ્રદેશ’, અને દસ પરખીડિયાં ‘વિસ્તાર’ હતાં. પ્રદેશની વસ્તુઓ (કે જરા શિષ્ટ ભાષામાં કહીએ તો બટકો

(Elements) દર્શાવવા x સંકેત વપરાય છે, અને એ x ને ચલચરણ(Variable)ના શુભ નામથી સંબોધવામાં આવે છે. x નો અર્થ—એટલે કે તેની કિંમત—એક જ નહિ, પણ અનુક્રમે પ્રદેશોમાંના એક-એક ઘટક થાય, માટે એ ચલચરણ જ કહેવાય છે. અભ્યારથી એ ખાસ નોંધવા વિનંતી છે કે તેનો પ્રદેશ જાણ્યા વિના x નો કોઈ અર્થ જ નથી. કેટલા અને કેવા પત્રો લખ્યા એનો ચોક્કસ ખ્યાલ પણ ન હોય તો પરબીડિયામાં સરનામાં કેમ લખાશે ? એ જ રીતે પરબીડિયાં માટે—એટલે કે બીજા ગણ (વિસ્તાર)ના ઘટકો માટે—પોતાનો ચલચરણ અને પોતાનો સંકેત— y —છે. y ની કિંમતો એ વિધેયના વિસ્તારના ઘટકો છે. વિસ્તારના જ્ઞાન વિના વિધેય અધૂરું જ રહેશે એ ખ્યાન પર લેવું.

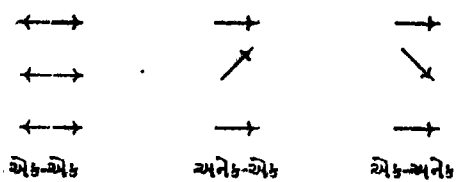
કેટલા પત્રો લખ્યા એ ઉપર કેટલાં પરબીડિયાં તૈયાર રાખ્યાં એનો આધાર રહેશે. બીજી રીતે—અચ્છિતની રીતે—કહીએ તો y ચલચરણનો આધાર x ઉપર હોય છે, માટે x ને નિરપેક્ષ કે સ્વતંત્ર ચલચરણ (Independent Variable), જ્યારે y ને સાપેક્ષ કે પરતંત્ર ચલચરણ (Dependent Variable) કહે છે. આમ વિધેયનું ચિત્ર માનસચક્ષુ આગળ ધીરે ધીરે સુરેખ બનતું જાય છે. એક પ્રદેશના ઘટકોને નિરપેક્ષ ચલચરણ દ્વારા દર્શાવીને તેમનો સંબંધ અમુક નિયમાનુસાર સાપેક્ષ ચલચરણ દ્વારા દર્શાવેલા વિસ્તારના ઘટકોની સાથે બાંધવાની જ વાત છે. હવે આ ‘નિયમ’ વિષે વધુ તપાસ કરવી પડશે.

૧.૩. સુસંગતતા

એક કાગળ તો એક જ પરબીડિયામાં મુકાય. કદાચ—સાથે રહેતા બે સગાં ભાઈઓને બે જુદા જુદા કાગળ લખ્યા હોય અને સાથે મોકલી શકાય એમ હોય તો—બે કાગળ એક જ પરબીડિયામાં પણ જાય. પરંતુ એક જ કાગળ માટે (એક કાગળની બે નકલો જ નહિ પણ એની એ જ નકલ માટે) બે બે જુદાં જુદાં પરબીડિયાં તૈયાર કર્યાં હોય તો ઘેર કોઈ મોટા વગર રહેશે નહીં...! માટે ગૃહકલેશ ટાળવાના શુભ હેતુથી શાંતિપ્રિય અચ્છિતશાસ્ત્રીઓએ દરબાબંધું છે કે પ્રદેશનો એક-એક ઘટક વિસ્તારના એક-એક ઘટક ઉપર જાય, અથવા તો પ્રદેશના બે કે વધારે ઘટકો વિસ્તારના એક ઉપર જાય પરંતુ વિધેયની છાયામાં બે રહેવું હોય તો પ્રદેશના એના એ જ ઘટકનો સંબંધ વિસ્તારના બે કે વધારે ઘટકો સાથે નહિ જ બંધાય. આ દરમાનનું ડહાપણ સમજવા બીજો એક દાખલો લઈએ.

એક મિત્રમાલિક પોતાના એજન્ટો જુદા જુદા શહેરોમાં મોકલે છે. (એજન્ટોના ગણ એ પ્રદેશ, અને શહેરોનો ગણ એ વિસ્તાર આટલો ખ્યાલ તો આવ્યો હશે ને!) દરેક એજન્ટ ક્યાં છે એ હમેશાં જાણવાનો શૈક્ષણિક આગ્રહ છે. જો તે એક-એક ભાઈને એક-એક શહેરમાં મોકલે, અથવા બેને—કે વધારે પણ—એક જ શહેરમાં મોકલે, તો તેનો હેતુ સરે. પણ જો તે એક એજન્ટભાઈને કહે કે “તમે મુંબઈ જાઓ અથવા મદ્રાસ જાઓ”, તો ચોક્કસ ખ્યાલ રહેશે નહિ કે તે ભાઈ મુંબઈ ગયો કે મદ્રાસ ગયો. પોતાના એજન્ટોની સાથે શૈક્ષણિક સીધા સંપર્ક રાખવો હોય તો દરેકને નિશ્ચિત કરેલા શહેરમાં મોકલવો જોઈએ. સુનિશ્ચિતતા એ જેમ વેપારમાં તેમ અચ્છિતમાં પણ સફળતાની ચાવી છે. માટે વિધેય માટેનો નિયમ એવો બરીથી કે તેને લઈને પહેલા ગણના દરેક ઘટકનું “શું થાય છે” એ આપણે ચોક્કસપણે જાણી શકીએ, અને એટલા માટે પ્રતિષ્ઠા લઈશું કે પ્રદેશના કોઈ એક ઘટકને વિસ્તારના એક જ ઘટક સાથે સાંકળી લઈશું.

એ ગણ એકબીજાની સાથે સાંકળી લીધા એટલે તેમના ઘટકો વચ્ચે સુસંગતતા ('Correspondence') સ્થપાઈ છે એમ કહીશું. આમ તો સુસંગતતા ગણ પ્રકાશની રીતે શકે છે: એક ગણનો દરેક ઘટક બીજા ગણના એક ઘટક સાથે સંકળાય, અને એકબીજા ગણ (આને એક-એક સુસંગતતા—One-one correspondence કહીશું); એક ગણના એ કે જ્યારે ઘટકો બીજા ગણના એક જ ઘટક સાથે સંકળાય (અનેક-એક સુસંગતતા—Many-one correspondence); અને એક ગણના એક ઘટક બીજા ગણના અનેક ઘટકો સાથે સંકળાય (એક-અનેક સુસંગતતા—One-many correspondence). નીચેની આકૃતિ ઉપરથી વાત સમજાઈ આવશે.



આકૃતિ ૧

આમાંથી પહેલા એ પ્રકારની સુસંગતતાઓ વિધેયમાં આવી શકે, પણ ત્રીજી તો નહીં. પ્રદેશ અને વિસ્તારના ઘટકો વચ્ચે સંબંધ સ્થાપનાર સુસંગતતા 'એક-એક' કે 'અનેક-એક' હોઈ શકે, પણ 'એક-અનેક' તો નહીં. આટલી સ્પષ્ટતા થઈ એટલે વિધેયની સુનિશ્ચિત વ્યાખ્યા વણવા બધા તાર હાથમાં આવી ગયા.

૧.૪. વ્યાખ્યા અને સંકેત

એક ગણનો પ્રત્યેક ઘટક બીજા ગણના એક અને ફક્ત એક ઘટક સાથે સાંકળવાથી વિધેય થાય છે. આ ટૂંકા વર્ણનમાં પ્રદેશ (પહેલો ગણ), વિસ્તાર (બીજો ગણ), અને 'એક-એક' કે 'અનેક-એક' સુસંગતતા (પહેલા ગણનો એક ઘટક બીજાના એક જ ઘટક સાથે સંકળાય) એ ત્રણ મુદ્દાઓ છે. વ્યવહારમાં કોઈ પણ વિધેય દર્શાવવા એ ત્રણ બાબતો સ્પષ્ટપણે દર્શાવવાની રહેશે. એ માટે ત્રણ જુદી જુદી પદ્ધતિઓ છે તે હવે જોઈએ.

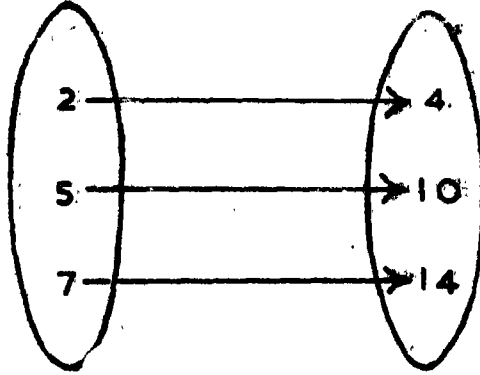
૧.૫. I. રેખાચિત્રની પદ્ધતિ

ધારો કે વિધેયનો પ્રદેશ 2, 5, અને 7 એવા પૂર્ણાંકોથી બનેલો હોય, જ્યારે વિધેયનો વિસ્તાર 4, 10, 14થી બનેલો હોય, અને સુસંગતતાનો નિયમ દરે 4 સાથે, 5ને 10 સાથે, અને 7ને 14 સાથે સાંકળવાનો હોય ('એક-એક' સુસંગતતા). પરિસ્થિતિનો પૂરો ખ્યાલ સામેની આકૃતિમાંથી મળશે, અને તેથી એવું રેખાચિત્ર આ વિધેયનું એક સાચું નિરૂપણ છે.

II. બેડકાંઓની પદ્ધતિ

હમણાં નિરૂપાવેલું વિધેય હમણે, પ્રદેશમાંના 2 એ વિસ્તારમાંના 4 સાથે સંકળાયેલો છે એ બતાવવા આપણે કોંસમાં પ્રથમ 2 અને પછી 4 સૂચી શકીએ: (2, 4). એવી તમામ

‘ફંક્શન’ નો અર્થ : (i) વિધેયની સંપૂર્ણ મત્તિકાની પણ મળે છે; દા.ત., પ્રસ્તુત ઉદાહરણમાં :
(2, 4), (5, 10), (7, 14)



આકૃતિ ૧

કો‘સ મને કે કમમાં લખી શકાય, પણ દરેક કો‘સની અંદર સંખ્યાઓના ક્રમ સાચવવો જોઈએ. ‘અનેક-એક’ સુસંગતતા સ્વીકાર્ય ન હોવાથી એ કો‘સમાં પ્રથમ ઘટક સરખા આવી ન શકે એ સહજ નોંધીએ.

III. વિધેયાત્મક સંબંધની પદ્ધતિ

ઉપરના દાખલામાં વિસ્તારનો દરેક ઘટક એ પોતાની સાથે સંખ્યાએના પ્રદેશના ઘટક કરતાં બમણો છે એ તરત જણાઈ આવે છે. વિધેયના પ્રદેશના ઘટકો x વડે દર્શાવીએ તો દરેકને અનુરૂપ વિસ્તારનો ઘટક $2x$ હશે, એટલે કે સુસંગતતાનો નિયમ

$$x \rightarrow 2x$$

એ સંકેતથી બતાવી શકાય. વળી ફરિ પ્રમાણે જો વિસ્તારના ઘટકો y વડે દર્શાવીએ તો

$$y = 2x$$

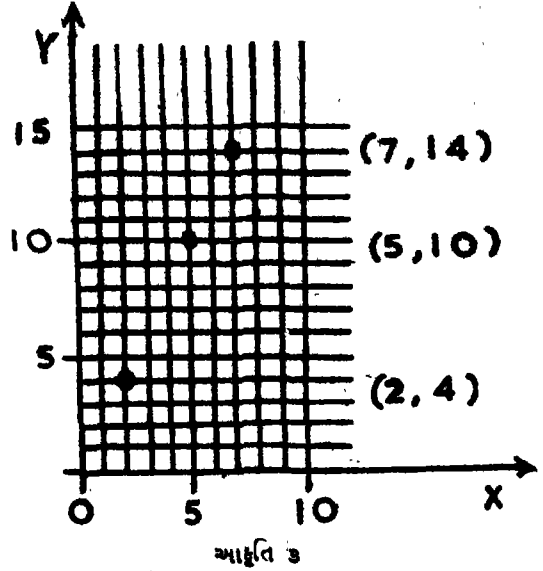
એ સૂત્ર મળે. એવું સૂત્ર મળે તો એને વિધેયાત્મક સંબંધ (Functional Relation) કહે છે, અને $y = f(x)$ વડે દર્શાવે છે. પરંતુ આ સૂત્રની એવી મર્યાદા છે કે (તે મળી શકતું હોય તોપણ) તે ઉપરથી વિધેયના પ્રદેશ કે વિસ્તારનો ખ્યાલ આવતો નથી. માટે આ ત્રીજી પદ્ધતિ લઈને વિધેય દર્શાવવું હોય તો તેનું પૂર્ણ નિરૂપણ કરવા માટે $y = f(x)$ સૂત્ર ઉપરાંત વિધેયના પ્રદેશ અને વિસ્તાર જણાવવા આવશ્યક છે.

૧. ૬. આલેખ.

જોડકાએ વડે થયેલા વિધેયના નિરૂપણ ઉપરથી વિધેય અને આલેખ (graph) વચ્ચેનો સંબંધ સમજાઈ આવશે. પહેલો ઘટક x , બીજો y , અને સુસંગતતા (x, y) છે, માટે યામ-અભિતિા સોજ-નથી x -અક્ષ અને y -અક્ષ ઉછીના લઈને કાટખૂણે ગોઠવીએ, (x, y) ને એક ‘બિંદુ’ સમજીને તેનું સ્થાન યામોની જગ્યામાં શોધી લઈએ, અને દરેક જોડકા માટે એવું કામ ધીરજપૂર્વક કરી આપીએ ત્યારે અક્ષોવાળા કાગળ ઉપર દપકારપે

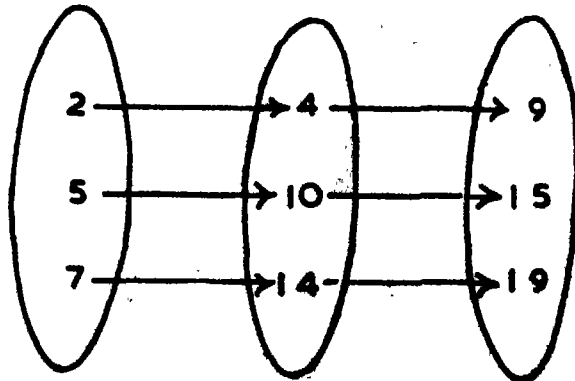
આપણા વિષયનું નિરૂપણ થઈ ચૂક્યું હતું. એનું નામ આલેખ દા.ત., §૧.૪માં વિષયનો આલેખ નીચેની આકૃતિમાં દર્શાવ્યો છે.

આલેખ ઉપરથી વિધેય સમૂહ પૂરી માહિતી મળે છે, માટે તે દ્વારા પણ વિધેયનું નિરૂપણ કરી શકાય. બીજી પદ્ધતિથી આવેલા વિધેયનો આલેખ પણ દોરી શકાય, અને આલેખ દ્વારા આપેલું વિધેય જોડ કે સૂત્ર દ્વારા પણ દર્શાવી શકાય. જેમ કે જે પછી જોડકાઓનો મૂલ્ય વિધેય નથી તેમ કે જે પછી આલેખ વિધેયનો આલેખ પણ નથી. કો'સના પહેલા ઘટક નહીં બેવડાય એ પ્રતિબંધનો ભૌમિતિક અર્થ એ થશે કે કે જે પછી બિંદુના ઋ-ચામ સરખા ન હોવા જોઈએ; બીજી રીતે કહીએ તો y -અક્ષને સમાંતર કે જે પછી સુરખા ઉપર આલેખનાં બે — કે વધારે — બિંદુ આવવાં ન જોઈએ.



૧.૭. વિધેયનું વિધેય

વિધેય તો 'એક મૂલ્યમાંથી બીજા મૂલ્ય ઉપર જવાની રીત' છે એમ જરા હળવી શૈલીમાં કહી શકાય. અને જેમ એક મૂલ્યમાંથી બીજામાં આપણે ગયા તેમ હવે બીજામાંથી ત્રીજામાં જતાં આપણને કેણું રોકી શકે? આ પ્રયોગ વિધેયનું વિધેય (Function of a Function) અથવા મિશ્ર વિધેય (Composite Function) જેવાં સાર્થક



આકૃતિ ૪

નામોથી ઓળખાય છે. આપણી ત્રણે સંકેત પદ્ધતિઓમાં એ સરળતાથી વ્યક્ત કરી શકાય છે.

(i) આકૃતિ ૪ જુઓ.

(ii) $(2, 4, 9), (5, 10, 15), (7, 14, 19)$.

(iii) $x \rightarrow +2x : y = f(x)$; પ્રદેશ 2, 5, 7; વિસ્તાર 4, 10, 14.

$y \rightarrow y + 5 : z = g(y)$; પ્રદેશ 4, 10, 14; વિસ્તાર 9, 15, 19.

ત્રીજી પદ્ધતિ ખાસ ઉપયોગમાં લેવાય છે, એટલે તેની થોડી વધારે ચર્ચા કરીએ. x ઉપર એ વિધેય ઉપરાઉપરી ચલાવવામાં આવ્યાં છે, f અને g . પહેલા વિધેયનો વિસ્તાર બીજાનો પ્રદેશ બની જાય છે, માટે પહેલામાં x અને y , જ્યારે બીજામાં y અને z વાપર્યાં છે. હવે બંને વિધેયોનું આખરી પરિણામ એક જ સૂત્રથી દર્શાવવું હોય તો $z = g(y)$ માં y નો પહેલો સંબંધ $y = f(x)$ મૂકીએ તો $z = g[f(x)]$ જેવો મિશ્રિત સંબંધ મળે. એમાં પહેલા વિધેયના પ્રદેશ— x —માંથી છેલ્લા વિધેયના વિસ્તાર— z —સુધી એક જ મજલે જઈએ છીએ. એટલું જ યાદ રાખીએ કે જોકે પ્રથમ g અને પછી f લખાય છે તોપણ ગણતરીમાં ઊલટા ક્રમમાં લેવાના છે : પ્રથમ f અને પછી g .

દા.ત., જો $f(x) = 1 - x$, અને $g(x) = x/(x - 1)$ તો $g[f(x)]$ શોધીએ.

$$g[f(x)] = \frac{f(x)}{f(x) - 1} = \frac{(1 - x)}{(1 - x) - 1} = \frac{x - 1}{x}.$$

અથવા તો બીજી રીતે :

$$g[f(x)] = g(1 - x) = \frac{(1 - x)}{(1 - x) - 1} = \frac{x - 1}{x}.$$

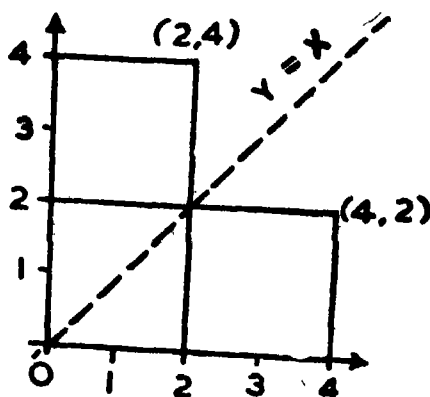
૧.૮. પ્રતિવિધેય

એક ગણમાંથી બીજા ગણમાં તો ગયા. હવે પાછા ન આવ્યા? રેલવે માટે આ વળતી ટિકિટનો પ્રશ્ન છે. ગણિતમાં એને પ્રતિવિધેય (Inverse Function) નો પ્રશ્ન કહે છે. અને પ્રશ્ન સહેલો પણ છે. અસલ વિધેયનો પ્રદેશ એ પ્રતિવિધેયનો વિસ્તાર બનશે, અને વિસ્તાર એ પ્રદેશ, આટલું તો આપોઆપ સમજાય છે. પરંતુ સુસંગતતાનું શું? મૂળ વિધેયની સુસંગતતા ‘એક-એક’ પ્રકારની હોય તો પાછા આવતી વખતે પણ એ ‘એક-એક’ રહેશે, એટલે કે પ્રતિવિધેય માટે જોઈએ એવી સુસંગતતા મળશે અને તે ખરેખર ‘વિધેય’ બની શકશે. પરંતુ મૂળ વિધેયની સુસંગતતા જો ‘અનેક-એક’ પ્રકારની હોય તો વળતી વખતે એ ‘એક-અનેક’ પ્રકારની બની જશે, અને વિધેય માટે આવેલો નિષેધ હોવાથી પ્રતિવિધેય અહીં નહીં સંભવે. આમ એક સ્પષ્ટ અને દૂરગામી પરિણામ મળે છે કે અસલ વિધેય ‘એક-એક’ પ્રકારનું હોય તો જ એનું પ્રતિવિધેય મળશે. આ સાદો સિદ્ધાંત જુદી જવાથી (કે વિવેક છોડીને સાચું કહીએ તો કદીયે ન જાણવાથી) અનેક ગણિતશિક્ષકો અને લેખકો પ્રતિવિધેયને—અને વિદ્યાર્થીઓને!—અક્ષમ બન્યાય કરે છે.

જોકડાંઓની દૃષ્ટિએ પણ પ્રતિવિધેયોનો વિચાર કરવા જેવો છે. મૂળ વિધેય (x, y) જેવા કોષમાંથી નિર્ધારિત હોય તો સંકેતો બદલીને પ્રતિવિધેય (y, x) જેવા કોષમાંથી

જામરો: (x, y) માં પહેલા ઘટકો બેવડાઈ ન શકે (જે ૧-૪ જુઓ), આટલે x સરખા નહીં આવે. એ જ રીતે (y, x) માં પહેલો ઘટક y હોઈ એ બેવડાશે નહીં. એ x કે એ y સરખા નહીં આવે એટલે સુસંગતતા 'એક-એક' પ્રકારની હશે એ નિર્વિવાદ છે, અને તેથી કોસોમાં આટલો પ્રતિબંધ મૂક્યો તો વિધેયનું પ્રતિવિધેય મળશે.

(x, y) બિંદુઓ લઈને વિધેયનો આલેખ આપણે દોર્યો. દા.ત., જો $x=2$ માટે $y=4$ હોય તો $(2, 4)$ બિંદુ આલેખ ઉપર આવે. હવે પ્રતિવિધેયમાં x અને y ની અદલા-બદલી થવાથી જો $(2, 4)$ મૂળ વિધેયનું એક બિંદુ હોય તો $(4, 2)$ પ્રતિવિધેયનું એક બિંદુ હશે. આલેખની દૃષ્ટિએ આનો શો અગત્યનો અર્થ થાય છે એ થોડો વિચાર કરીને (કે વિચાર કરવાની રુચિ કેટલેવન હોય તો આકૃતિ ૪ ઉપર જરા નજર ફેરવીને) સમજાશે: વિધેય અને પ્રતિવિધેયના આલેખ $y=x$ સુરેખા સંબંધે એકબીજાનાં પ્રતિબિંબ જ છે.



આકૃતિ ૫

$f(x)$ સંકેતપદ્ધતિ અનુસાર અસલ વિધેય માટે f વાપરીએ તો પ્રતિવિધેય માટે f^{-1} જેવો સ્વયંસ્પષ્ટ સંકેત વાપરીશું. અને 'એક-એક' હોવા જોઈએ એ યાદ રાખવું. હવે અમુક ગણ્ય ઉપર f વિધેય ચલાવીએ અને પછી f^{-1} ચલાવીએ તો શું પરિણામ આવે? અમદાવાદથી મુંબઈ જઈએ અને મુંબઈથી પાછા અમદાવાદ આવીએ તો હતા ત્યાં જ ને! હા, અને આ સરળ વાતને શાસ્ત્રીય ઓપ ચડાવવો હોય તો આપણે એમ લખીશું કે, $f^{-1}[f(x)] = x$. આલેખની રીતે વિચારીએ તો પ્રતિબિંબનું પાછું પ્રતિબિંબ લઈએ તો મૂળ 'બિંબ' આવશે ને!

આ બધા મુદ્દાઓ સમજાવવા એક ઉદાહરણ લઈએ.

મૂળ વિધેય: સર, $y = \frac{2x+1}{3}$; પ્રદેશ, 1, 4, 7.

$$1 \rightarrow \frac{2 \times 1 + 1}{3} = 1,$$

$$4 \rightarrow \frac{2 \times 4 + 1}{3} = 3,$$

$$7 \rightarrow \frac{2 \times 7 + 1}{3} = 5.$$

માટે વિધિનો વિસ્તાર 1, 3, 5 છે; અને સુસંગતતા 'એક-એક' પ્રકારની જ છે.

પ્રતિવિધિય : પ્રદેશ 1, 3, 5; વિસ્તાર 1, 4, 7.

સૂત્ર શોધવા $y = \frac{2x+1}{3}$ નો x માટે ઉકેલ કરીએ :

$$x = \frac{3y-1}{2}.$$

$$1 \rightarrow \frac{3 \times 1 - 1}{2} = 1,$$

$$3 \rightarrow \frac{3 \times 3 - 1}{2} = 4,$$

$$5 \rightarrow \frac{3 \times 5 - 1}{2} = 7.$$

$$\text{વળી } f^{-1}[f(x)] = \frac{3f(x)-1}{2} = \frac{3 \frac{2x+1}{3} - 1}{2} = x.$$

બંને આલેખ દ્વારા તે એકબીજાનાં પ્રતિબિંબ છે એની ખાતરી વાચક કરી શકશે આટલો વિશ્વાસ તો છે જ.

પરિશિષ્ટ રૂપે જેનાં પ્રતિવિધિયો અચ્ચુતકાર્યમાં રોજ વપરાય છે (અને જેનો પ્રદેશ-વિસ્તારનો વિવેક ન કરવાયો રોજ પણ ગૂંચવાડા ઊભા થાય છે) એવા વિધિયો, તેમની સુસંગતતા 'એક-એક' નીવડે એ પ્રદેશ-વિસ્તારની મર્યાદા સાથે, અહીં આપીએ છીએ.

વિધિય	પ્રદેશ	વિસ્તાર
$y = x^2$	$-\infty < x < \infty$	$0 < y < \infty$
$y = \sin x$	$-\frac{\pi}{2} < x < \frac{\pi}{2}$	$-1 < y < 1$
$y = \cos x$	$0 < x < \pi$	$-1 < y < 1$
$y = \tan x$	$-\frac{\pi}{2} < x < \frac{\pi}{2}$	$-\infty < y < \infty$
$y = \cot x$	$0 < x < \pi$	$-\infty < y < \infty$
$y = \sec x$	$0 < x < \frac{\pi}{2}, \frac{\pi}{2} < x < \pi$	$-\infty < y < -1, 1 < y < \infty$
$y = \operatorname{cosec} x$	$-\frac{\pi}{2} < x < 0, 0 < x < \frac{\pi}{2}$	$-\infty < y < -1, 1 < y < \infty$
$y = e^x$	$-\infty < x < \infty$	$0 < y < \infty$

Function : A Short Summary in English

The central idea is to introduce the correct notion of a function through Gujarati medium in an informal manner. With this point of view, the fundamentals are first introduced with the help of concrete illustrations of situations described from everyday practical experiences.

1.1 is an introduction via situations which can be described by functions. It is brought out how (even unknowingly) functions are used in common situations like parties where the guests are to be assigned seats and dishes: or like posting letters where every letter is to be placed in a properly addressed envelop.

In 1.2 notions of 'domain' and 'range' inseparately associated with functions are described. The terms 'elements', 'variables', 'value', independent and dependent variables are then explained. Different correspondences—one to one—many-one and one—many are introduced in 1.3. Illustrations are again supplied from the surrounding environments of our day to day life.

1.4 carries in it an appropriate definition of notion of a function. Symbolism associated with this notion is also introduced here. Three methods—the line diagram method, the ordered pair method and the method of functional relationship are described in 1.5.

Section 1.6 explains the 'graph' of a function. How a complete idea of a function can be obtained from its graph is also explained here.

In sections 1.7 and 1.8 the 'composite' functions and 'inverse' functions are introduced. Again illustrations are provided. It is indicated here that the graphs of a function and its inverse are symmetrical about the line $y=x$. In the end a table of several functions with their associated domains and ranges is given.

MECHANISM OF FORMATION OF SODIUM CARBONATE IN SOILS: ROLE OF CALCIUM CARBONATE AND GYPSUM

R. K. SHAH, J. C. VORA and A. J. GANDHI

*University School of Sciences
Gujarat University, Ahmedabad-9*

Formation of soda in soil is affected by many factors.^{1, 2, 3} It is necessary that soil complex must be sodiumised, soluble salts should be subsequently removed and calcium carbonate should be present to furnish bicarbonate and carbonate ions. In the present work influence of calcium carbonate and gypsum is being considered.

A few laboratory experiments were devised to study the role of calcium carbonate and gypsum in the reaction leading to formation of sodium carbonate.

Experiment No. 1:

Na-soil and Na-soil- CaCO_3 (CaCO_3 20%) were continuously leached with distilled water and pH of the leachate was measured.

Experiment No. 2:

Varying quantities of Na-soil and CaCO_3 were mixed. The mixtures so prepared were treated with varying quantities of water; pH of equilibrium mixtures was measured.

Experiment No. 3:

Na-soil- CaCO_3 , treated with different quantities of water, 0.001M CaSO_4 solution, 0.005M CaSO_4 solution and 0.01M CaSO_4 solution; pH measured.

Data obtained from experiments 1, 2 and 3, are presented in tables 1, 2 and 3 respectively.

TABLE 1

Experiment: Effect of different quantities of water on continuous leaching of:

A = 10 g Na-soil

B = 20 g Na-soil-CaCO₃ (CaCO₃ 20 %)

as studied by pH measurements.

Ml. H ₂ O added	pH original suspension	pH of extract		
		I	III	IV
A	50	9.2	8.5	8.0
	100	9.3	8.5	8.0
	200	9.1	8.1	7.8
	300	9.0	7.8	—
	350	8.9	—	—
B	50	9.5	—	9.3
	100	10.1	—	9.5
	200	10.0	—	9.6
	300	10.0	—	9.6
	350	—	—	9.6

TABLE 2

Experiment: Effect of variable proportions of Na-soil and CaCO₃ on pH of different soil : Water equilibrium mixtures.

Set				
A	50.0 g	Na-Soil	+ 0.0 g	CaCO ₃
B	49.5 g	"	+ 0.5 g	"
C	48.0 g	"	+ 2.0 g	"
D	45.0 g	"	+ 5.0 g	"
E	46.0 g	"	+ 10.0 g	"
F	30.0 g	"	+ 20.0 g	"
G	0.0 g	"	+ 50.0 g	"

Set	Ml. H_2O added	pH	Set	Ml H_2O added	pH
A	20	8.5	E	20	9.4
	40	8.9		40	9.7
	60	9.0		60	10.0
B	20	8.9	F	20	9.5
	40	9.3		40	9.8
	60	9.5		60	10.0
C	20	9.1	G	20	9.8
	40	9.5		40	9.9
	60	9.6		60	10.0
D	20	9.2			
	40	9.6			
	60	9.7			

TABLE 3

Experiment : Effect of $CaSO_4$ -solution.

(Different concentrations) on development of alkalinity, on its reaction with Na-soil- $CaCO_3$ ($CaCO_3$ 20%)

Set	A	50 g Na-soil- CaCO_3 + H_2O			
"	B	"	+ 0.001M CaSO_4 soln.		
"	C	"	+ 0.005M " "		
"	D	"	+ 0.01M " "		
<i>Ml. of H_2O or CaSO_4-soln.</i>		<i>pH of Equilibrium Mixture</i>			
		<i>Set A</i>	<i>Set B</i>	<i>Set C</i>	<i>Set D</i>
20		9.6	9.3	9.2	8.6
40		10.0	9.7	9.2	8.6
60		10.2	9.8	9.1	8.5
70		10.2	9.8	9.0	8.5

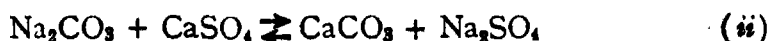
Discussion

Data in table 1 reveal that although Na-soil may hydrolyse leading to alkaline reaction, alkalinity is obtained to a much greater extent in presence of calcium carbonate. Subsequent leaching reduces alkalinity in both cases, but to a much smaller extent in presence of calcium carbonate. Data in table 2 shows that increasing the percentage of $CaCO_3$ in a sample of Na-soil- $CaCO_3$, increases alkalinity until the percentage of $CaCO_3$

reaches a value of about 20. Subsequent increase of CaCO_3 has no appreciable effect. Presence of gypsum is inhibitive to the reaction, leading to formation of sodium carbonate. In fact, gypsum has an ameliorating effect on the soil, the greater the amount of gypsum the quicker the alkali soil returns to the normal soil⁴. The overall reaction, leading to formation of sodium carbonate in soils, may be represented as follows :



When gypsum is added, the following reaction takes place :



Soluble calcium salts, inhibit reaction (i) going towards the right. In addition, whatever little sodium carbonate has formed, reacts with calcium sulphate to form more insoluble calcium carbonate as one of the products of reaction. It is obvious therefore, that in soils containing gypsum, formation of soda is impossible.

We are thankful to the A. E. Society and the Gujarat University for laboratory facilities. We are thankful to the C.S.I.R. for providing grants towards equipment and scholarship to one of us (A.J.G.). Thanks are also due to Dr. A. M. Trivedi for his interest in the work.

References

1. Modesir, P. de, *Sur le role du pouvoir des terres dans la formation des carbonates des soude naturels*, Comt. rend., 1888, 160 : 459-462.
2. A. A. J. de 'Sigmond, *The Principles of Soil Science*, Thomas Murby & Co., London, 1938, p. 137.
3. Kelley, W. P., and Cummins, A. B., *The Formation of Sodium Carbonate in Soils*, Calif Agr. Expt. Sta. Tech. Paper 3 : 1923, pp. 1-35.
4. Van Der Molen, W. H., *The Exchangerable Cations in Soils Flooded with Sea Water*, Versl-Landbouwk Onderz, No. 63-17-'s-Gravenhage-1957, pp. 111-120.

ON TRIANGULAR NUMBERS WHICH ARE SUMS OF TWO TRIANGULAR NUMBERS

S. M. SHAH

Sardar Patel University, Vallabh Vidyanagar

1. Introduction :

Triangular numbers are defined by the relation $T_n = n(n+1)/2$, n being a positive integer. Many interesting properties have been given by Rev. Canon D. B. Eperson. [1] It has been shown by Sierpinski, W.[2] that the necessary and sufficient condition that a triangular number T_n be the sum of two triangular numbers is that $n^2 + (n+1)^2$ should be a composite number. In this note we give a systematic method of finding triangular numbers which are sums of two triangular numbers. It seems from this note that there is an infinite number of triangular numbers which are sums of two triangular numbers.

2. The Main Theorem :

Let T_n be the sum of two triangular numbers T_p and T_q . Then we have the equation

$$n(n+1) = p(p+1) + q(q+1) \quad \dots (2.1)$$

which must be satisfied by positive integers p and q . Let a be any positive integer. Let d be any divisor of T_a i.e. T_a/d is a positive integer less than or equal to T_a . Then a solution of (2.1) is provided by

$$q = a + T_a/d, \quad p = a + d, \quad n = p + q - a \quad \dots (2.2)$$

Thus we have proved the following theorem :

Theorem 2-1: If a be any positive integer and d be any divisor of T_a then $T_{a+d+(T_a/d)}$ is a triangular number which is the sum of two triangular numbers T_{a+d} and $T_{a+(T_a/d)}$.

Corollary : If a be any positive integer then

$$T_{Ta+1} = T_{a+1+T_a} = T_{a+T_a} + T_{a+1} \quad .$$

The proof follows from theorem 2.1 by taking $d=1$ or T_n .

Taking $a=1, 2, 3, 4, \dots$, we can determine from (2.2) the value of p, q and n such that $T_n = T_p + T_q$. As a can be chosen in infinite number of ways, it is obvious that there exists an infinite number of triangular numbers which are sums of two triangular numbers. Table 1 gives triangular numbers which are sums of two triangular numbers for $a=1, 2, 3, \dots, \dots, 15$.

TABLE 1

Triangular numbers which are sums of two Triangular numbers

a	p	q	n	$T_n = T_p + T_q$
1	2	2	3	$6 = 3 + 3$
2	3	5	6	$21 = 6 + 15$
3	5	6	8	$36 = 15 + 21$
	4	9	10	$55 = 10 + 45$
4	6	9	11	$66 = 21 + 45$
	5	14	15	$120 = 15 + 105$
5	8	10	13	$91 = 36 + 55$
	6	20	21	$231 = 21 + 210$
6	9	13	16	$136 = 45 + 91$
	7	27	28	$406 = 28 + 378$
7	11	14	18	$171 = 66 + 105$
	9	21	23	$276 = 45 + 231$
	8	35	36	$666 = 36 + 630$
8	14	14	20	$210 = 105 + 105$
	12	17	21	$231 = 78 + 153$
	11	20	23	$276 = 66 + 210$
	10	26	28	$406 = 55 + 351$
	9	44	45	$1035 = 45 + 990$
9	14	18	23	$276 = 105 + 171$
	12	24	27	$378 = 78 + 300$
	10	54	55	$1540 = 55 + 1485$
10	15	21	26	$351 = 120 + 231$
	11	65	66	$2211 = 66 + 2145$
11	17	22	28	$406 = 153 + 253$
	14	33	36	$666 = 105 + 561$
	13	44	46	$1081 = 91 + 990$
	12	77	78	$3081 = 78 + 3003$

1	2	3	4	5
12	18	25	31	496 = 171 + 325
	15	38	41	861 = 120 + 741
	14	51	53	1431 = 105 + 1326
	13	90	91	4186 = 91 + 4095
13	20	26	33	561 = 210 + 351
	14	104	105	5565 = 105 + 5460
14	21	29	36	666 = 231 + 435
	19	35	40	820 = 190 + 630
	17	49	52	1378 = 153 + 1225
	15	119	120	7260 = 120 + 7140
15	25	27	37	703 = 325 + 378
	23	30	38	741 = 276 + 465
	21	35	41	861 = 231 + 630
	20	39	44	990 = 210 + 780
	19	45	49	1225 = 190 + 1035
	18	55	58	1711 = 171 + 1540
	17	75	77	3003 = 153 + 2850
	16	135	136	9310 = 136 + 9180

From Table 1, we note that the same triangular number may in certain cases be expressed as the sum of two triangular numbers in more than one way, e.g. $T_{36} = T_9 + T_{35} = T_{14} + T_{33} = T_{21} + T_{29}$. The first twenty triangular numbers which are sums of two triangular numbers are

$$T_3, T_6, T_8, T_{10}, T_{11}, T_{13}, T_{15}, T_{16}, T_{19}, T_{20}, T_{21}, T_{23}, T_{26}, T_{27}, T_{29}, T_{31}, T_{33}, T_{36}, T_{37}, T_{38}.$$

References

- [1] Rev. Canon D. B. Eperson (1963), 'Triangular Numbers', The Mathematic Gazette, Vol. XLVII, 236-37.
- [2] Sierpinski, W. (1962), 'Sur les nombres triangulaires qui Sont Sommes de deux nombres triangulaires'. Elem. Math., 17, 63-65.

MULTIPOLAR SPINDLES — A MEIOTIC IRREGULARITY IN *CAREX WALLICHIANA* Presc.

C. K. SHAH

University School of Sciences
Gujarat University, Ahmedabad-9

The plant is a monoecious winter weed bearing 3-4 male spikes at the top and 1-2 female ones lower down on the scape. The male floret consists of three stamens.

The anther is four-lobed. A single, hypodermal archesporial layer divides to form a large group of microspore mother cells. While they prepare for meiosis, a special mucilaginous wall is secreted between the protoplasts and the cell wall. After meiosis I, an ephemeral cell plate is initiated but it disappears before completion (Fig. 1). During Meiosis II, the spindles may be parallel (Fig. 2) or at right angles to each other, resulting in a tetranucleate mother cell (Fig. 4).

Several instances of multipolar spindles were observed during meiosis II. The multiple spindle is a meiotic irregularity in which more than one spindle occurs in a high proportion of second metaphase cells (Grundmann, 1963). The spindle fibres appeared at more than two poles in *Carex wallichiana* Presc. as well as *Cyperus articulatus* L. The fibres, arranged in several groups, were unevenly distributed on the whole spindle. In a sectional view, the spindles are directed towards the three acute poles and the chromosomes are seen on the triradiate plate (Fig. 3). When fibres develop more rapidly than they have time to stretch, a multipolar spindle is often formed with the chromosomes spread over a large surface of the spindle. During late anaphase, however, the spindle was bipolar. The anaphase separation of the tripolar spindle seems improbable, because the microspore nuclei if formed, may not have the haploid constitution (Brachet & Mirsky, 1961). But in *Psilotum*,

Okabe (1929) has observed several distinct nuclei in a cell formed as a result of multipolar spindles.

Heitz (1935) and Hedayetullah (1933) observed a similar (Multiple spindle) feature in *Melandrium* and *Oenothera missouriensis* respectively. In *Clarkia exilis* (Vasek, 1962), the multipolar spindles reduce pollen fertility. In *Vicia faba*, Sakamura (1920) obtained such spindles by treating the anthers with chloral hydrate. Intense cold (Michaelis, 1926) and certain chemicals (Barthelmess & Einlechner, 1959) have also been effective.

Such a spindle departure may have some significance for the family Cyperaceae. It is only in this family that of the four microspore nuclei produced after meiosis (tetrad), only one develops further (monad), while the other three become pushed toward one end of the mother cell. About 30 per cent of the pollen mother cells revealed multipolar spindles but invariably a tetranucleate mother cell resulted after the division. Such a behaviour precludes any correlation between the cyperaceous monad and the formation of a multipolar spindle. The above observations were also confirmed by the propiono-carmin squash preparations of the microsporocytes.

Literature cited

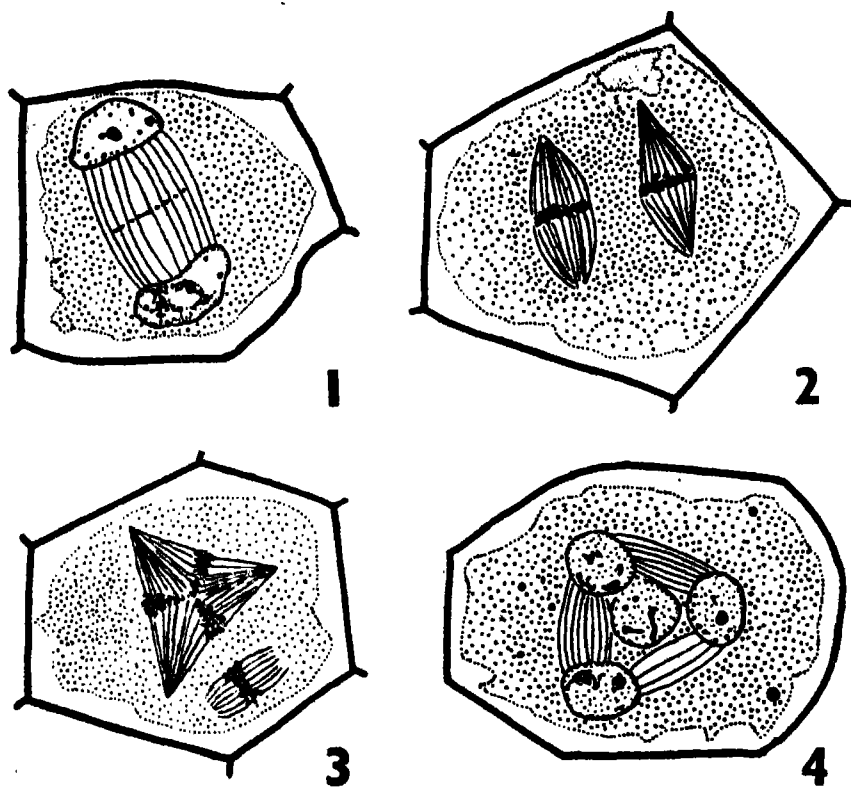
- Barthelmess, A. & Einlechner, J. 1959. Chemically induced multipolar mitosis. *Protoplasma* **51** : 325.
- Brachet, J. & A. E. Mirsky, 1961. The cell, Vol. III. Meiosis and Mitosis. Academic Press, New York.
- Grundmann, E. 1963. Allgemeine Cytologie. Academic Press, New York.
- Hedayetullah, S. 1933. Meiosis in *Oenothera missouriensis*. *Proc. roy. Soc.* **113** : 57-70.
- Heitz, E. 1925. Beitrag zur Cytologie von *Melandrium*. *Arch. wiss. Bot.* **1** : 241-259.
- Sakamura, T. 1920. Experimentelle studien über du Zellund Kernteilung. *J. Coll. Sci. Tokyo* **39** : 1-221.

Michaelis, P. 1926. Über den Einfluss der Kette über die
Reduktionsteilung von *Epilobium*.

Planta 1 : 569-582.

Okabe, S. 1929. Über eine tetraploide Gartenrasse von *Psilotum
nudum*, Palisot de Beauvois (-*P. triquetrum*,
Sw.) und die tripolique Kernteilung in ihren
Sporenmutterzellen. Sci. Rep. Tohoku
Univ. 4 : 373-380.

Vasek, F. C. 1962. Multiple spindle—a meiotic irregularity in
Clarkia exilis. American J. Bot. 49 : 536-39.



Figs. 1-4: Microsporogenesis in *Carex walltichtiana*

Fig. 1: Microspore dyad. Fig. 2: Meiosis II. Fig. 3: Pollen mother cell in second division showing one bipolar and one tripolar spindle. Fig. 4: A tetranucleate pollen mother cell. All $\times 1500$.

COMPARISON OF THE BOUNDS FOR THE NUMBER OF COMMON TREATMENTS BETWEEN TWO BLOCKS OF CERTAIN TWO ASSOCIATES PBIB DESIGNS

S. M. SHAH

Sardar Patel University, Vallabh Vidyanagar

1. Introduction

Using the method based on the characteristic roots, Agrawal [1] obtained the following result about the bounds for the number of common treatments between two blocks of two associates PBIB designs :

Theorem 1.1 : If N is the incidence matrix of a two associates PBIB design with parameters v, b, r and k ; and $rk > \mu_0 > \mu_1$ are the characteristic roots of NN' ; then the number of common treatments x between any two blocks satisfies

$$\max [0, 2k - v, k - \mu_0] \leq x \leq \min [k, \mu_0 - k + 2b^{-1}(rk - \mu_0)].$$

a) For a SRGD design [3], $\mu_0 = r - \lambda_1$, $\mu_1 = 0$.

Hence x satisfies

$$\max [0, 2k - v, T_1] \leq x \leq \min [k, T_2], \quad (1.1)$$

where $T_1 = k - r + \lambda_1$ and

$$T_2 = r - \lambda_1 - k + 2b^{-1} \cdot (rk - r + \lambda_1).$$

This result is also separately proved by Agrawal [2].

b) For a two associates PBIB design having triangular association scheme [3], and $rk - v\lambda_1 = n(r - \lambda_1)/2$, $\mu_0 = r - 2\lambda_1 + \lambda_2$, $\mu_1 = 0$. Then x satisfies

$$\max [0, 2k - v, T_1] \leq x \leq \min [k, T_2], \quad (1.2)$$

where $T_1 = k - r + 2\lambda_1 - \lambda_2$ and

$$T_2 = (r - 2\lambda_1 + \lambda_2) (1 - 2b^{-1}) - k (1 - 2b^{-1} \cdot r).$$

c) For a two associates PBIB design having a L_2 association scheme [3], and $rk - v\lambda_1 = s(r - \lambda_1)$, $\mu_0 = r - 2\lambda_1 + \lambda_2$, $\mu_1 = 0$. Then x satisfies

$$\max [0, 2k - v, T_1] \leq x \leq \min [k, T_2], \quad (1.3)$$

where $T_1 = k - r + 2\lambda_1 - \lambda_2$ and

$$T_2 = (r - 2\lambda_1 + \lambda_2) (1 - 2b^{-1}) - k (1 - 2b^{-1} \cdot r).$$

The author [4] has proved the following results about the bounds for the number of common treatments x between two blocks of the designs considered above in (a), (b) and (c).

It follows, $T_1 = \{k(r-1)/(b-1)\} - A \cdot (b-2)^{\frac{1}{2}}$ and $T_2 = \{k(r-1)/(b-1)\} + A \cdot (b-2)^{\frac{1}{2}}$, A having different values for different designs.

Theorem 1.2: For a SRGD design, x satisfies

$$\max [0, T_1] \leq x \leq \min [k, T_2], \quad (1.4)$$

where $A^2 = k^2 (v-k) (b-r) (b-v+m-1)/v(v-m)(b-1)^2$.

Theorem 1.3: For a two associates PBIB design with $rk - v\lambda_1 = n(r - \lambda_1)/2$ and having a triangular association scheme, x satisfies

$$\max [0, T_1] \leq x \leq \min [k, T_2], \quad (1.5)$$

where $A^2 = k^2 (v-k) (b-r) (b-v+n-1)/v(v-n)(b-1)^2$.

Theorem 1.4: For a two associates PBIB design with $rk - v\lambda_1 = s(r - \lambda_1)$ and having a L_2 association scheme, x satisfies

$$\max [0, T_1] \leq x \leq \min [k, T_2], \quad (1.6)$$

where $A^2 = k^2 (v-k) (b-r) (b-v+2s-2)/v(s-1)^2 (b-1)^2$.

In this paper, we prove that the bounds (1.1), (1.2) and (1.3) obtained by Agrawal ([1], [2]) are superior to the bounds (1.4), (1.5) and (1.6) obtained by the author [4]. As the proofs are similar, we give the proof only for SRGD design.

2. Main Result

Theorem 2.1: The bounds (1.1) are superior to the bounds (1.4)

Proof: From the definitions of T_1 and T_2 , it can be easily verified that

$$T_1 - k = k(b-r)(b-2v+2m-2)/b(v-m), \quad (2.1)$$

$$T_2 - k = k(b-r)(b-2v+2m-2)/[b(v-m) + \{b(b-2)(v-m)(b-v+m-1)\}^{\frac{1}{2}}] \quad (2.2)$$

$$k - T_2 = [1 + \{(b-2)(b-v+m-1)/b(v-m)\}^{\frac{1}{2}}](k - T_1). \quad (2.3)$$

From (2.1) and (2.2), it follows that, when $b = 2v - 2m + 2$, both T_u and T_s are equal to k . Also, when $b > 2v - 2m + 2$, T_u and T_s are greater than k and hence the upper bound is again k . Thus, when $b \geq 2v - 2m + 2$, both upper bounds $\min[k, T_u]$ and $\min[k, T_s]$ are equal to k . However, when $b < 2v - 2m + 2$, it follows from (2.1), (2.2) and (2.3) that $T_u < T_s$, the sign of equality holding when $b = v - m + 1$. Thus, we see that the upper bound $\min[k, T_u]$ is superior to the bound $\min[k, T_s]$ for $v - m + 1 < b < 2v - 2m + 2$.

$$\text{Next, let } P = \frac{k(r-1)}{(b-1)} - T_u, Q = \frac{k(r-1)}{(b-1)} - T_s,$$

and $R = \frac{k(r-1)}{(b-1)} - (2k-v)$. Then it can be shown that

$$P^2 - Q^2 = \frac{k^2(b-r)^2(b-v+m-1)}{(b-1)^2(v-m)} \left[\frac{(b-2)}{b} - \frac{(b-v+m-1)}{(v-m)} \right], \quad (2.4)$$

$$P^2 - R^2 = \frac{(v-k)^2}{(b-1)^2} \left[\frac{rk(b-2)(b-v+m-1)}{v(v-m)} - (b-r-1)^2 \right], \quad (2.5)$$

From (2.4) and (2.5), we have

$$\left. \begin{aligned} T_1 < T_u, & \text{ if } (b-2)(v-m) > b(b-v+m-1) \\ & = T_u, & \text{ if } (b-2)(v-m) = b(b-v+m-1) \\ & > T_u, & \text{ if } (b-2)(v-m) < b(b-v+m-1) \end{aligned} \right\} \quad (2.6)$$

and

$$\left. \begin{aligned} 2k-v > T_1, & \text{ if } rk(b-2)(b-v+m-1) > v(v-m)(b-r-1)^2, \\ & = T_1, & \text{ if } rk(b-2)(b-v+m-1) = v(v-m)(b-r-1)^2, \\ & < T_1, & \text{ if } rk(b-2)(b-v+m-1) < v(v-m)(b-r-1)^2, \end{aligned} \right\} \quad (2.7)$$

From (2.6) and (2.7), we note that $T_1 < T_u$ and $T_1 < (2k-v)$ can happen simultaneously if $(b-2)(v-m) \geq b(b-v+m-1)$ and

$$rk(b-2)(b-v+m-1) \geq v(v-m)(b-r-1)^2,$$

$$\text{i.e., if } r^2(b-2)^2 \geq b^2(b-r-1)^2,$$

$$\text{i.e., if } (2k-v) \geq 0.$$

Thus, if $(2k-v) \geq 0$, then $T_1 \leq \max[2k-v, T_u]$. When $2k-v < 0$, we take the complementary design N^* with parameters $v^* = v, b^* = b, r^* = b-r$. Then $T_1^* = v - 2k + T_1, T_u^* = v - 2k + T_u$ and

$2k^* - v^* = v - 2k > 0$. Arguing as before, we have $T_i^* < \max [T_i^*, 2k^* - v^*]$, i.e., $T_i < \max [T_i, 0]$, i.e., $T_i < \max [0, T_i, 2k - v]$. Thus, the lower bound $\max [0, T_i, 2k - v]$ is superior to the lower bound $\max [0, T_i]$.

References

- [1] Agrawal, H. (1964) : On the bounds of the number of common treatments between blocks of certain two associates PBIB designs, Calcutta Statistical Association Bulletin, 13, 76-79.
- [2] Agrawal, H. (1964) : On the bounds of the number of common treatments between blocks of semi-regular group divisible designs, Journal of the American Statistical Association, 59, 867-871.
- [3] Bose, R. C. and Shimamoto, T. (1952) : Classification and analysis of partially balanced designs with two associates classes, Journal of the American Statistical Association, 47, 151-190.
- [4] Shah, S. M. (1965) : Bounds for the number of common treatments between any two blocks of certain PBIB designs, Annals of Mathematical Statistics, 36, 337-342.

A SIMPLE METHOD FOR CALCULATING DIPOLE MOMENTS OF DIATOMIC ALKALI HALIDE MOLECULES

V. B. GOHEL *and* M. D. TRIVEDI

Physics Department
Sheth M. N. Science College,
Patan (N. G.)

Making use of the potential energy function for diatomic ionic molecules of NaCl type, suggested by Rittner,¹ Lachhman Das² et al suggested that the theoretical values of the dipole moments can be calculated from the following formula :

$$\mu_{theo} = e\gamma_e - \left[\frac{e\gamma_e^4(a_1 + a_2) + 4e\gamma_e a_1 a_2}{\gamma_e^6 - 4a_1 a_2} \right] \quad \dots(1)$$

Where

γ_e = Equilibrium Internuclear Separation distance.

e = Electronic Charge.

a_1 and a_2 are the polarizability values of the ions. Now the potential energy of the two ions due to attraction of free ion charges by dipoles p_1 and p_2 that appear due to polarisation $\left(-\frac{ep_1}{\gamma_e^3}, -\frac{ep_2}{\gamma_e^3}\right)$, interaction of dipoles $\left(-\frac{2p_1 p_2}{\gamma_e^3}\right)$ and quasi-elastic energy of dipoles $\left(\frac{p_1^2}{2a_1} + \frac{p_2^2}{2a_2}\right)$, is given by

$$U = -\frac{ep_1}{\gamma_e^3} - \frac{ep_2}{\gamma_e^3} - \frac{2p_1 p_2}{\gamma_e^3} + \frac{p_1^2}{2a_1} + \frac{p_2^2}{2a_2} \dots \dots(2)$$

From the conditions of the polarised equilibrium $\frac{\partial U}{\partial p_1} = 0$

and $\frac{\partial U}{\partial p_2} = 0$,

we have :

$$p_1 = \frac{a_1 e}{\gamma_e^3} + \frac{2a_1}{\gamma_e^3} p_2 \quad \text{and}$$

$$p_2 = \frac{a_2 e}{\gamma_e^3} + \frac{2a_1 a_2}{\gamma_e^5} p_1,$$

Whence, expanding into a power series in terms of $1/\gamma$, we find

$$p_1 = \frac{a_1 e}{\gamma_e^3} + \frac{2a_1 a_2 e}{\gamma_e^5} + \frac{4a_1^2 a_2 e}{\gamma_e^8} + \dots \quad (3)$$

$$p_2 = \frac{a_2 e}{\gamma_e^3} + \frac{2a_1 a_2 e}{\gamma_e^5} + \frac{4a_1 a_2^2 e}{\gamma_e^8} + \dots \quad (4)$$

$$\begin{aligned} \therefore \mu_{theo} &= e\gamma_e - p_1 - p_2 \\ &= e\gamma_e - \left\{ \frac{e(a_1 + a_2)}{\gamma_e^3} + \frac{4a_1 a_2 e}{\gamma_e^5} + \frac{4a_1 a_2 e(a_1 + a_2)}{\gamma_e^8} \right\} \dots (5) \end{aligned}$$

Eq. (5) Can be used to calculate the dipole moments. The values so calculated are given in column 2 of table No. 1. Column 3 gives the values of dipole moments calculated from Eq. (1) for comparison.

In calculations, the equilibrium internuclear distances given by Vidale³, Krasnov⁴ and Honing⁵ have been used. α_1 , α_2 values given by Pauling⁶ have been used.

Calculations of the Percentage Ionic Character of the Bond

Pauling⁷ has given an approximate procedure for estimating the partial ionic character of the bond from a knowledge of electronegativities of the two atoms, x_A and x_B . According to him, the degree of ionic character of binding is given by

$$1 - \exp - \left(\frac{x_A - x_B}{2} \right)^2 \quad \dots (6)$$

Pauling⁷ has also suggested a method for calculating the ionic behaviour from the experimental (μ_{exp}) and theoretical (μ_{theo}) values of the dipole moment, according to which the degree of the ionic character of binding is given by

$$\left(\frac{\mu_{exp}}{\mu_{theo}} - 1 \right) \quad \dots (7)$$

we calculate the degree of the ionic character by using the formula (7) and (5). These values of percentage ionic character are given in Column No. 5 of Table No. 1. The values of percentage ionic character obtained by different methods are given in Column No. 6 and 7 of Table No. 1.

TABLE 1
Dipole Moments and Percentage Ionic Character

Mole- cule	Dipole Moments in Debye			Percentage ionic character		
	Exp.	Eq. 5	Eq. 1	Dipole Mom- ents	Electro- negati- vities	Disso- cien- tion Energy
1	2	3	4	5	6	7
LiF	—	5.10	5.16	—	89.5	101.0
LiCl	—	5.43	5.39	—	69.5	—
LiBr	6.25 ± 0.15 ⁸	5.55	5.40	87.3	62.5	100.5
LiI	6.64 ± 0.2 ⁸	—	5.38	—	50.6	100.0
NaF	—	—	6.88	—	90.2	—
NaCl	8.5 ± 3.4 ⁵	7.801	7.77	91	71.1	96.0
NaBr	—	7.99	7.94	—	64.3	101.0
NaI	—	8.14	7.99	—	52.7	99.3
EF	8.62 ¹	8.11	8.07	94.2	91.7	95.0
KCl	10.48 ± 0.03 ⁵	9.23	9.14	86.5	74.6	96.1
KBr	10.41 ± 0.02 ⁵	9.65	9.58	92.2	69.2	94.8
KI	11.05 ⁸	9.47	9.93	—	57.1	102.5
RbF	—	9.02	7.95	—	91.7	99.0
RbCl	—	9.55	9.45	—	74.6	95
RbBr	—	10.11	9.92	—	69.2	96.1
RbI	—	11.97	10.38	—	57.1	101.2
CsF	7.874 ± 0.012 ⁵	7.37	7.27	93.2	92.1	97.7
CsCl	10.4 ± 0.1 ⁵	9.52	9.36	90.9	75.4	98.0
CsBr	—	10.08	9.97	—	69.2	102
CsI	12.1 ⁸	11.65	10.61	96.1	58.3	95.0

References

1. Rittner, E. S. J. Chem., Phys., 19 (1951), 1030.
2. Lachhman Das, Saxena, S. C. & C. M. Kachhava, Indian J. Pure Ap Phys. 3 (1965), 178.
3. Vidale, G. L. 1960, J. Phys. Chem., 64, 314.
4. Krasnov, K. C. 1959 Zhur. Neorg. Khim. 4, 530.
5. Honing, A Mandel, M., Stich, M. L. and Townes, C. H. (1954), Ph Rev., 96, 629.
6. Pauling, L., Proc. roy. Soc. All 4 (1927), 191.
7. Pauling, L. The nature of the Chemical bound (Cornell University Press Ithaca, New York), 1960.
8. Rodebush, W. H. Murray (Jr.) L. A. & Bixler, M. E. J. Chem Phys., 4 (1936), 372.

STUDIES IN SOME VARIETIES OF TOBACCO (Part IV)

Preparation of Optically active derivatives from Nicotine extracted from Tobacco Leaves

K. A. THAKER and K. A. PATEL

*Department of Chemistry
University School of Sciences
Gujarat University, Ahmedabad-9*

Alkaloids are basic in nature and so they can easily combine with acids forming esters. The alkaloid Nicotine reacts with aliphatic acids and forms esters which are liquid. The aromatic esters are however solid. The optical rotations of β -nicotine salts taken during preparations are recorded in the Table 1. It has been found that the compounds containing 1 mole nicotine and 3 moles of acid are slightly soluble in water while those having 1:1 proportions are readily soluble in water.

The nicotine esters of aromatic acids containing two $-\text{COOH}$ groups in ortho position to one another form good crystalline compounds. Esters of benzoic, benzilic, aminobenzoic, mandelic and cinnamic acids are amorphous. Substitution of one or several $-\text{NO}_2$ groups or sulphur containing group favours crystalline formation as is the case with nitro and dinitrobenzoic acid, sulphanilic acid and nitrosalicylic acid. Mandelic acid and benzilic acid yield amorphous esters.

Experimental

1. Nicotine m-nitrobenzoate :

To m-nitrobenzoic acid (3.09 g.) in a small amount of ether (20 c.c.), nicotine extracted from tobacco leaves (1 g.; 50%) was added, the product crystallised out, boiled with hot methyl acetate and charcoal yielding pale yellow crystals, m.p. 112° , yield 94%.

2. Nicotine p-nitrobenzoate :

To p-nitrobenzoic acid (3.09 g.) dissolved in ether (20 c.c.) was added nicotine (1 g.) and the contents kept at 50-60° with constant stirring, for $\frac{1}{2}$ hour. The product which crystallised out was further purified by crystallisation in methyl acetate with animal charcoal, yielding a pale brown crystalline compound, m.p. 136-140°, yield 95%.

3. Nicotine 5-nitrosalicylic acid :

Nicotine 5-nitrosalicylic acid (1.2 g.) dissolved in hot absolute alcohol was added the nicotine solution (1 gm.; 95% pure) drop by drop with constant stirring at 60°. After the addition, the temperature was raised to 80° and cooled, when a yellow crystalline substance was obtained which was purified further from absolute ethanol, when a yellow crystalline compound was obtained, m.p. 158°, yield 85 %.

4. Nicotine Salicylate :

Salicylic acid (1.34 g.) was dissolved in hot absolute alcohol (10 c.c.) and to this nicotine was added (1.5 g., 95% pure) nicotine drop by drop and the contents constantly stirred at 60-65° for 2 hours. On cooling pinkish white crystalline compound was obtained which was crystallised from ethanol, m.p. 117°, in pinkish white crystals, yield 88 %.

5. Nicotine Sulphanilate :

Nicotine (5 g.) was added to sulphanilic acid (5.98 g.) suspended in hot absolute alcohol and the contents kept for 2 hours with constant stirring at 70-80°. On cooling the viscous semi-solid liquid so obtained was dried in vacuo for 2 days when a dull brown solid was obtained. The crude stuff was crystallised twice from methyl alcohol, in the form reddish brown crystals, m.p. 126°, yield 90 %.

6. Nicotine o-Phthalate :

O-Phthalic acid (5.9 g.) was dissolved in absolute alcohol and to this was added drop by drop the nicotine solution (8.0 g.; 95% pure) and the reaction mixture was kept at 60° with constant stirring. On cooling a colourless crystalline

Specific rotations of Nicotine derivatives in different solvents
(1, 1; c. 2 in different solvents [α] D)

Sr. No.	Solvents	Nicotine m-nitro-benzoate	Nicotine p-nitro-benzoate	Nicotine salicylate	Nicotine o-phthalate	Nicotine d-tartrate	Nicotine Sulphate	Nicotine Picrate	Nicotine 5-nitro-salicylate
1.	Water	—	+ 12.82	—	—	+ 25.8	+ 5.37	—	—
2.	Methyl alcohol	+ 75.13	+ 37.93	+ 65.03	+ 77.8	+ 122.5	+ 9.67	+ 109.68°	—
3.	Ethyl alcohol	+ 75.01	+ 39.74	+ 71.17	+ 69.69	+ 164.4	+ 8.03	—	+ 68.92
4.	Acetone	+ 63.30	+ 41.36	+ 135.00	+ 84.47	—	—	—	—
5.	Benzene	—	—	+ 150.10	—	—	—	—	—
6.	Toluene	—	—	+ 137.60	—	—	—	—	—
7.	Xylene	—	—	+ 148.40	—	—	—	—	—
8.	Methyl acetate	+ 67.27	+ 43.68	+ 80.93	+ 121.30	—	—	—	—
9.	Ethyl acetate	+ 83.03	+ 38.39	+ 77.20	—	—	—	—	—
10.	Carbon disulphide	—	—	+ 231.50	—	—	—	—	—
11.	Chloroform	—	—	+ 107.10	+ 180.20	—	—	—	—
12.	Acetic anhydride	+ 88.0	+ 3.37	+ 85.06	+ 44.95	—	—	—	—
13.	Acetic acid	+ 71.53	+ 10.82	+ 120.00	+ 103.90	+ 132.40	—	—	—

compound was obtained which was crystallised twice from ethanol yielding colourless crystals, m.p. decomposes 188°, yield 95%.

7. Nicotine Tartarate :

Nicotine (5 g.) was continuously added to tartaric acid (4.6 g.) dissolved in mixture of absolute alcohol and ether at about 50°. On cooling, nicotine tartarate precipitated which was recrystallised twice from ethanol, m.p. 112°, colourless yield 85%.

8. Nicotine picrate :

Picric acid (16.65 g.) dissolved in 500 c.c. of water was added the nicotine solution (5 g.) gradually, so as to get a yellow precipitate of nicotine picrate. This was filtered, dried and recrystallised twice from water, as orange crystals, m.p. 221-222° yield, 92 %.

The optical rotations of all these derivatives of nicotine have been taken in different solvents like benzene, xylene, toluene, ethyl alcohol, methyl alcohol, acetic acid, chloroform, carbon disulphide, cyclohexane, methyl acetate, ethyl acetate, etc. and are recorded in Table 1.

L-Nicotine taken for the work showed $\alpha_D^{28} - 174.5$ (l. 1).

The optical rotations of the various derivatives prepared were then compared. These derivatives are found to be dextro-rotatory. The specific rotation of nicotine-m-nitrobenzoate is maximum in acetic anhydride, and minimum in acetone. If -NO₂ group is at para position to -COOH, the optical rotation is maximum in methyl acetate and minimum in acetic anhydride. The optical rotation of nicotine salicylate is maximum in carbon disulphide and minimum in ethyl alcohol.

Of all the derivatives, nicotine salicylate has been found to show maximum rotation, $[\alpha]_D^{28} + 231.5$ (c. 2 in carbon disulphide) while nicotine-p-nitrobenzoate shows the minimum rotation in acetic anhydride, $[\alpha]_D^{31} + 3.36$.

CHEMICAL PROPERTIES OF COASTAL SALINES OF CAMBAY-VADGAM AREA

A. M. TRIVEDI, R. K. SHAH and A. J. GANDHI

University School of Sciences, Ahmedabad-9

Abstract :

The Soils of the Coastal Salines in the Cambay-Vadgam area lying between $22^{\circ} 19' \times 22^{\circ} 14'N$ and $72^{\circ} 37' - 72^{\circ} 48'E$ were investigated for their chemical properties and mechanical composition. The soils are silty-sand loam in texture. Average calcium carbonate content is 6 per cent. pH of soils falls within the range 7.0 to 8.0. The soils indicate a high level of salinity and may be classed saline-alkali soils. Initial leaching with sea-water, followed by leaching with flood waters of Sabarmati and Mahi and applying suitable dosage of gypsum can reclaim 50,000 acres of sea-inundated salines.

The area lies between $22^{\circ} 19' - 22^{\circ} 14'N$ and $72^{\circ} 37' - 72^{\circ} 48'E$ in the Kaira District in Gujarat. It is a gentle, undulating, alluvial plain without any visible rock exposure.¹ The climate may be considered pleasant, being $108^{\circ}F - 75^{\circ}F$ in May and $84^{\circ}F - 46^{\circ}F$ in January.² The average annual precipitation in the area is about 30". Wheat, rice, millets, pulses, tobacco and cotton are the chief crops of the area. Wells and surface tanks are the major sources of irrigation water. Near the towns of Cambay and Vadgam, skirting the shore of the gulf along the banks of rivers Mahi and Sabarmati, vast tracts of salt marshes are found, which frequently get submerged at high tides.

The area contains the towns Cambay and Vadgam. The area is shown in Map No. 1. 91 samples from 32 profiles were selected from a 10×3 sq. mile area along the shore-line. The river Sabarmati meets the Gulf of Cambay near village Wainej. In general, the area closely resembles the Cambay-Dhuvaran area on the eastern side; the intrusion of sea-water inland

appears to be more widespread in this part. The salines here are comparatively more dry than those near Cambay-Dhuvaran coast line. The average depth of water table in the area is 8-12'.

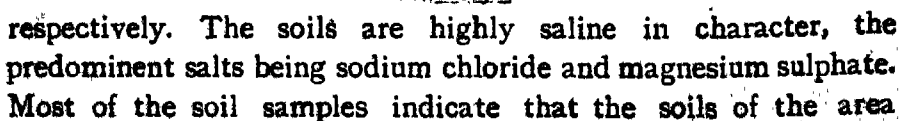
Samples of soil were generally collected from virgin land. The surface layer up to 3" was collected separately. Samples were taken up to 2-3" depth. Normally sampling was done with a cylindrical auger, but whenever necessary representative layers of the profiles were sampled after digging a pit of 3' x 2' x 3' (4'). The various portions of a particular depth interval were intimately mixed and about 3 lbs. of the sample was collected. In some places the sites were selected in view of change in vegetation or of distinct profile features met with.

A brief description of location and sampling sites is given below:

<i>S.No.</i>	<i>Depth</i>	<i>Description and Location</i>
421 A	0-3"	Sample from virgin land having takyr formation at the village Lunej. Soil is plastic and black in colour.
424 A	0-3"	Sample from a less saline pasture
B	3"-1'	land at a slightly higher level, near
C	1'-2'	village Dehda. Plastic black soil.
427 A	0-3"	Sample of black plastic and saline
B	3"-1'	soil one mile away from village
C	1'-2'	Juni-Akhol. Lime nodules are present.
430 A	0-3"	Sample from a virgin land one mile away from village Juni-Akhol, towards village Navagam. Black soil with lime nodules.
479 A	0-1'	Sample of non-saline soil near
B	1'-2'	Cambay. Millet crop is taken.

Analytical data for these typical samples are presented in tables 1, 2 and 3.

The soils of the area are silty-sand loam in texture. The average percentage of clay, silt, sand and calcium carbonate are 15 (10-20), 40 (30-50), 40 (30-50) and 6 (4-8)



belong to saline-alkali type. pH values for most of the soils fall within the range 7.0 to 8.0. The soils may be considered sea-inundated saline-alkali soils.

To get a comparative idea, the soluble constituents of this coastal saline are compared with an arid-zone saline in Little Rann of Kutch. In Cambay-Vadgam (coastal saline) area, the ratios $rNa : rCl$, $rMg : rCl$, $rCa : rCl$, $rK : rCl$, $rSO_4 : rCl$, $rHCO_3 : rCl$ are 0.93, 0.16, 0.20, 0.01, 0.21, 0.10, while in Santalpur-Gramdi (arid-zone Saline) area, the values for different ratios are 1.78, 0.28, 0.53, 0.25, 0.45, 1.80 respectively. This illustrates the nature of salinity into major types of salines.

Reclamation of saline land in Camay-Vadgam and Cambay-Dhuvaran areas can provide about 50000 acres of land, useful for agriculture. The waters of Sabarmati and Mahi and in addition those of Vatrak and Meshvo which flow through adjoining tracts can be made available for desalinization of soils. Sites will have to be selected carefully, for building up reservoirs to store flood waters. Stopbanks will have to be erected to prevent ingress of sea-water. A comprehensive drainage scheme will have to be worked out so that the waters available are fully utilized, and the water table is maintained at a proper depth. Even Saline waters (sea-water with suitable dilution), may be utilized for the initial stage of leaching.³ Chemical amendment such as addition of gypsum is necessary, as the soils are high in exchangeable sodium and lack in adequate reserves of calcium. After the salts have been leached out and the calcium status of the soil increased, suitable rotation of crops will have to be suggested.

We are thankful to C.S.I.R. for the Scheme 'Studies of Saline Soils in Gujarat', and to A. E. Society and the Gujarat University for laboratory facilities.

References

1. Gazetteer of Bombay Residency, Govt. Central Press, Vol. VI, 1880, pp. 182-241 and Vol. VII, 1883, pp. 1-154.
2. Shah, C. C., 'Soils of Gujarat', Indian National Congress Souvenir, 1961, part III, pp. 7-15.
3. Kelley, W. P. 'Alkali Soils', Reinhold Publishing Corporation, U.S.A., 1951, p. 155.

TABLE 1

Chemical Analysis of Saturation Extracts of Cambay-Vadgam Soils

S.No.	pH	EC x 10 ³		Milliequivalents per litre								Cl	SAR
		at 25°C		Ca	Mg	Na	K	CO ₃	HCO ₃	SO ₄			
421 A	7.4	53.21		67.0	171	539	10.0	Nil	4.3	103		655	49
B	7.4	26.61		51.0	61.0	312	Tr	Nil	6.0	113		315	41
C	7.5	37.68		52.5	71.9	490	Tr	Nil	3.4	98.7		491	62
424 A	7.8	9.38		23.6	20.8	78.4	Nil	0.6	3.2	8.2		112	16
B	7.7	16.49		26.0	29.0	202	Nil	Nil	3.7	66.7		175	38
C	7.3	20.45		34.0	43.2	243	Nil	0.7	2.6	100		222	39
427 A	7.1	118.50		128	270	1869	Tr	Nil	4.4	87.8		2235	132
B	7.8	25.36		40.8	41.6	310	Nil	0.7	4.0	94.4		296	48
C	7.6	30.42		40.0	41.3	380	Nil	Nil	9.3	100		366	39
430 A	7.6	9.42		25.6	18.6	97.3	Nil	Nil	8.0	66.0		60.0	20
B	7.6	20.30		35.8	64.4	243	Tr	Nil	8.8	89.2		240	34
C	7.7	39.61		67.2	96.8	664	Tr	1.3	7.6	83.6		532	51
479 A	7.6	0.49		3.5	0.4	1.3	Nil	Nil	3.1	Nil		4.4	0.9
B	7.4	0.66		3.4	1.7	1.5	Nil	0.4	3.1	Nil		5.7	0.9

TABLE 2
Exchangeable Bases : Cambay-Vadgam Soils

S.No.	S.P.	ECx10 ³ at 25°C	pH	Milliequivalents per 100 g soil				ESP
				T.E.C.	Na	K	Ca+Mg	
421 A	87	53.21	7.4	26.4	15.25	3.05	8.17	57
B	102	26.61	7.4	25.1	7.01	2.20	15.94	28
C	80	37.68	7.5	30.7	10.77	1.87	18.05	35
424 A	62	9.38	7.8	25.4	6.84	0.44	17.14	27
B	73	16.49	7.7	32.2	11.58	0.33	20.33	36
C	87	20.45	7.3	32.1	11.58	1.43	19.11	37
427 A	58	118.50	7.1	20.1	16.23	0.99	2.94	81
B	85	25.36	7.8	29.4	13.44	1.98	14.03	46
C	98	30.42	7.6	38.6	6.14	1.87	30.67	16
430 A	72	9.42	7.6	28.9	9.90	1.98	17.05	34
B	76	20.30	7.6	29.2	13.21	2.20	13.78	45
C	74	39.61	7.7	32.1	9.05	1.98	21.09	28
479 A	46	0.49	7.6	21.8	3.02	0.66	18.16	14
B	41	0.66	7.4	23.9	1.40	0.44	22.15	5.8

TABLE 3

Mechanical Analysis of Cambay-Vadgam Soils

Fraction	Village S. No. Depth	LUNEJ			DEHEDA			JUNI-AKHOL		
		421A 0-3"	421B 3'-1'	421C 1'-2'	424A 0-3"	424B 3'-1'	424C 1'-2'	427A 0-3"	427B 3'-1'	427C 1'-2'
%										
Coarse Sand		0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
Fine Sand		28.1	29.7	21.4	34.5	38.8	39.3	45.5	42.1	38.5
Silt		48.4	49.4	56.2	38.0	36.4	38.0	28.2	35.6	38.4
Clay		14.6	13.2	15.2	18.6	18.0	14.8	14.6	10.0	12.0
CaCO ₃		5.3	5.5	4.6	6.3	5.7	5.4	5.5	8.8	8.0
Org. matter and Sol. Salts		3.0	1.8	2.0	0.4	0.8	1.2	4.5	1.5	2.1
Total		99.5	99.7	99.5	98.0	99.8	98.8	98.4	98.1	99.1

INHIBITION OF THE CORROSION OF COPPER IN AMMONIUM CHLORIDE SOLUTIONS

S. S. RANA and M. N. DESAI

*Chemistry Department
University School of Sciences
Gujarat University, Ahmedabad-9*

Abstract :

The paper describes the influence of Agar and Gelatine (as corrosion inhibitors) on the corrosion of copper in 0.2 N, 0.5 N and 1.0 N ammonium chloride solutions. Agar has been found to be a better corrosion inhibitor than gelatine. The efficiency of agar as an inhibitor increases with the concentration of ammonium chloride. The potential and polarization measurements indicate a predominant action of agar on the cathode. The inhibitor efficiency of agar could be calculated by evaluating the values of exchange current density with and without agar. The results obtained with gelatine are interesting. At low concentrations of gelatine the corrosion of copper in ammonium chloride solutions is accelerated. Acceleration was also noticed even at 2% concentration of gelatine when the corrosive action proceeds for a long period of time. The general trend of the change in potential with time at low concentration of gelatine is towards more positive values as compared with its total absence in this system. The polarization measurements indicate a high polarization of the cathode at low current densities, whereas at high current densities, the values of cathode potential in the presence and in the absence of gelatine become practically identical, probably due to desorption of gelatine at high current densities. The potential of copper in the presence of 2% gelatine shifts towards more negative values, indicating the polarization of the local cathodes.

INHIBITION OF THE CORROSION OF COPPER IN AMMONIUM CHLORIDE SOLUTIONS

S. S. RANA and M. N. DESAI

*Chemistry Department
University School of Sciences
Gujarat University, Ahmedabad-9*

M. N. Desai, J. D. Talati¹ et al., investigated the influence of Agar, Gelatine, Dextrine, Acacia, etc. on the corrosion of alpha and alpha-beta brasses in ammonium chloride solutions. It was observed that gelatine, acacia and dextrine were accelerators of the corrosion of alphabrace in 1.0 N ammonium chloride solutions, whereas acacia and dextrine were found to retard the corrosion process to the extent of 46.8% and 26% respectively. Agar (0.2%) decreases the corrosion of both the alpha as well as the beta brasses in ammonium chloride solution to an extent of about 87.0%. It is interesting to note that though Agar decreases the corrosion, it does not decrease the dezincification process in brass; gelatine on the other hand reduces the dezincification yet the corrosion process is not reduced in any way. In this paper it was suggested that a mixture of these two retarders would furnish some interesting information for the corrosion process of brass in ammonium chloride solutions. W. Kohler² however carried out this work later.

The present paper describes the effect of Agar and Gelatine on the corrosion of copper in ammonium chloride solutions of 0.2 N, 0.5 N and 1.0 N.

According to F. Ritter³, E. Rabald and H. Bretschneider⁴, pure copper and copper alloys in ammonium chloride solution show distinctly different behaviours. According to these authors copper is attacked strongly by a 5% ammonium chloride solution (6.3 g./m.²/day). The 70/30 and 60/40 brasses in comparison to copper are considerably stable (0.8 g. to 3.3 g./m.²/day). Zinc bronze (8.6 g. to 15.4 g./m.²/day) and Manganese bronze (10.4 g./m.²/day) are also attacked strongly in ammonium chloride solution (5%), whereas Beryllium bronze was found to be practically completely resistant to the action of even a 10% ammonium chloride solution.

The greater solvent action of ammonium chloride in the case of copper may be attributed to the removal of the protective film of copper oxide on account of its solubility in ammonium chloride solution. Moreover the ability of the ammonium ions to form complexes with copper must also be taken into consideration. Cupric chloride also acts as a corrosive agent and an oxygen carrier. In the case of brasses we have observed that as the proportion of copper increases in the alloy, the corrosion increases, but dezincification decreases.

Experimental :

Electrolytic copper, supplied by Messrs Kamani Metals and Alloys Ltd., Bombay was used in this investigation. The preparation of the metal specimens (6 cm. \times 3 cm., thickness 28 S.W.G.), the corrosion tests and the cleaning operation of the specimens after the completion of the corrosion process were carried out as described in our previous publications.⁵ Potential and polarization measurements were carried out as described before.⁶ Corrosion studies and all other measurements were carried out at $35 \pm 0.1^\circ\text{C}$.

Results are represented in table 1 and fig. 1.

Results and Discussion :

In general, corrosion of copper in ammonium chloride increases with concentration. The effect of the concentration of ammonium chloride, however, is not perceptible during one day.

Agar :

The effect of inhibitor concentration on inhibitor efficiency was evaluated for 5 days duration. In 0.1 N ammonium chloride solution at a concentration of 0.5 % of agar, inhibition is to an extent of only 9.8%. Now, when the concentration of agar is doubled, the efficiency of agar increases about 9 times. With further increase in the concentration of agar, there is very little additional protection brought about. Thus, when the concentration is increased from 0.1 to 1.0 %, the loss in wt. of copper further decreases by only 2 mg. It is interesting to compare the inhibitor efficiency of agar at a concentration of 0.05% in 0.2 N, 0.5 N and 1.0 N ammonium chloride solutions. It is

seen that the inhibitor efficiency increases with the increase in the concentration of ammonium chloride. The behaviour observed at higher concentrations of agar is also similar. Agar is an efficient corrosion inhibitor for copper in ammonium chloride solutions. When the concentration of agar is 0.2%, the loss in wt. of copper in 0.2 N, 0.5 N and 1.0 N ammonium chloride solutions are respectively 24.9, 25.5 and 28.0 mg./dm.², even though the loss in wt. of copper in corresponding ammonium chloride solutions without agar differ very widely.

The variation of inhibitor efficiency with time was also studied at the concentration of 0.2% agar. In all the three concentrations of ammonium chloride studied, the inhibitor efficiency increases after one day and in 0.2 N ammonium chloride solution, for three and five days the efficiency remains constant (88.4%) but falls by about 13%, in seven to nine days. In 0.5 N ammonium chloride solution, the efficiency reaches the maximum value (94%) for five days duration and subsequently decreases only by about 2%, whereas in 1.0 N ammonium chloride solution during three to nine days, the efficiency remains practically constant (95.5 to 96.8%).

Gelatine :

Though gelatine is a weak inhibitor as compared to agar, the results obtained with it are interesting. In 0.2 N, 0.5 N and 1.0 N ammonium chloride solutions, at lower concentrations of gelatine, there is an acceleration of corrosion which is found to increase with the concentration of ammonium chloride. In general, however the efficiency of the inhibitor is more in 0.2 N and 1.0 N solutions than in 0.5 N. When the concentration of gelatine is 1.0%, the inhibition of the corrosion of copper in 0.2 N, 0.5 N and 1.0 N ammonium chloride solutions is respectively 82.2%, 43.2% and 55.2%.

In 0.2 N ammonium chloride solution at the concentration of 2.0% gelatine, the inhibitor efficiency reaches a maximum value (85.8%) for five days duration while for a duration of seven days, the inhibitor efficiency falls off considerably (37.4%) and for 9 days duration there is an acceleration of corrosion

to the extent of 73.6%. In 0.5 N and 1.0 N ammonium chloride solutions also there is a sudden decrease in the inhibitor efficiency for seven days. The falling off of the protective action being much greater in 0.5 N as compared to that in 0.2 N and 1.0 N ammonium chloride solutions. In 0.5 N and 1.0 N ammonium chloride solutions also, there is acceleration of the corrosion of copper during nine days. More dilute the solution of ammonium chloride, the acceleration of the corrosion of copper is greater during 9 days. In general it can be concluded that at 2% concentration of gelatine, its inhibition effect persists only for five days.

Potential and Polarization studies :

Electrode potential measurements have been employed very widely for inhibitor studies. The limitations of such measurements must be however considered carefully. The potential of metals are generally subject to random fluctuations with time. These variations in potential are often difficult to interpret in detail. If minor fluctuations are ignored, potential measurements can give results of practical importance.

In the present case, the study was confined to 0.5 N ammonium chloride solutions. In 0.5 N ammonium chloride solution, the potential of copper during the first five minutes slightly shifts towards positive direction, but it becomes ultimately more negative, reaching a value of -246 mv. This persists for about one and a half hour, after which a small shift of 6 mv. in the negative direction, succeeded again by a small positive shift of 4 mv. after half an hour is observed. The potential at this value then remains constant for about 2 hrs. The value of the potential observed for a period of two days is -216 mv. which changes to -158 mv. during six days. Then it again becomes more negative with time and during 9 days, the potential is -180 mv.

In the presence of 0.05% agar, the inhibition for 5 days duration is only 17.2%. The values of the potential of copper in presence of 0.05% agar as compared to those in the absence of agar, are throughout more positive up to two days and then

become more negative up to seven days and then again become more positive with time. A different state of affair is seen when the concentration of agar is increased from 0.05% to 0.2%. In the presence of 0.2% agar, the potential of copper in 0.5 N ammonium chloride solution is more negative during first 25 minutes than that in 0.5 N ammonium chloride solution, then the potential becomes almost equal to that in 0.5 N ammonium chloride solution for about 100 minutes and afterwards the potential becomes more positive for about 30 minutes as compared to that in the absence of agar and finally for about 3 hours, the values of potential in the presence and the absence of agar become almost identical. During two to nine days, the potential is however throughout more negative in the presence of 0.2% agar than in its absence. This suggests that the inhibitive action of agar is associated with the preferential adsorption of agar on cathodic areas, whereby the potential shifts in the negative direction.

In the presence of 0.2% gelatine, the corrosion of copper in a 0.5 N ammonium chloride solution is accelerated to an extent of about 25% for five days duration. The values of the potential of copper in this solution in presence of 0.2% gelatine, are more negative as compared to those in its absence, during the initial period of one and a half hour. Afterwards, the values are more positive. In the presence of 2% gelatine, the values of the potential of copper in the same solution are more negative throughout, for eight days, as compared to those in its absence. From the loss in wt. data it is seen that, there is an acceleration of corrosion to an extent of 16.7% for nine days duration. This is well reflected when the potentials are compared for nine days in the absence and in the presence of 2% gelatine. In the presence of 2% gelatine, the potential is more positive as compared to that in its absence. The acceleration of the corrosion at 0.2% concentration of gelatine can be explained by suggesting that at low concentrations gelatine may be acting as a cathodic depolarizer and as a result, the potential in general shifts to more positive values as compared to those in 0.5 N

ammonium chloride solution alone; whereas at high concentrations it functions as a cathodic polarizer and the potential shifts in the more negative direction.

It was observed that in 0.5 N ammonium chloride solution, the cathode polarization is very high as compared to anode polarization. In the presence of 0.2% agar, the cathode polarization is increased considerably at low current densities, thus at current densities 1.624×10^{-5} , 3.25×10^{-5} , 4.87×10^{-5} , 6.5×10^{-5} amps./cm.², the polarization values in the absence of 0.2% agar are respectively -190 mv., -566 mv., -751 mv., -799 mv. while in the presence of the inhibitor, the values are -499 mv., -689 mv., -836 mv., -864 mv. respectively. At higher current densities however the values of cathode potential in the presence and the absence of agar do not differ considerably as those at low current densities. Thus from the polarization data, the action of agar is also indicated preferentially on the cathodic side. It is however to be noted that the steady state values of the potential of copper in the presence of agar and in its absence are almost identical, though in the former case they are slightly higher.

The cathode polarization curve with or without agar expressed as a plot of polarization vs. log current density, satisfies the Tafel equation. The straight line graphs when extrapolated give the values of i_0 , the exchange current density. From the graph, the values of exchange current density without and with agar are respectively, 7.634×10^{-12} amp./cm.² and 3.0×10^{-12} amp./cm.²

The inhibitor efficiency can be calculated by the following equation :

$$\text{Efficiency} = 100 \times \frac{i_0(\text{without inhibitor}) - i_0(\text{with inhibitor})}{i_0(\text{without inhibitor})}$$

$$\text{Efficiency} = 94\%$$

The value of the exchange current density is decreased by the presence of agar and this suggests the adsorption of the inhibitor on cathodic areas.⁷

The open circuit potential of copper in ammonium chloride in the presence of 2 % gelatine is -266 mv. whereas in its absence it is -244 mv. Thus in the presence of gelatine the potential shifts in the negative direction indicating the polarization of the local cathodic areas due to adsorption. In the presence of gelatine, the cathode polarization is increased considerably at low current densities, thus at current densities 1.624×10^{-5} , 3.25×10^{-5} , 4.87×10^{-5} and 6.5×10^{-5} amps./cm.² the polarization values in the absence and the presence of 2 % gelatine are respectively -190 mv., -566 mv., -751 mv., -799 mv. and -247 mv., -647 mv., -777 mv., -825 mv. At higher current densities, the values of cathode potential in the presence and the absence of gelatine become almost identical which in all likelihood due to the desorption of gelatine at high current densities. In the presence of gelatine the values of the anode polarization are slightly higher than in its absence.

Thanks of the authors are due to Prof. B. K. Vaidya for keen interest in the work. Thanks are also due to Gujarat State Industrial Research Board for research grants and for a Junior Research Fellowship to one of us (S. S. Rana).

TABLE 1

Variation of Inhibitor efficiency of Agar and Gelatine with time and the influence of Inhibitor concentration on Inhibitor efficiency.

Ammonium Chloride + Agar-Agar

Normality	Inhibitor concentra- tion %	Weight loss of specimen (mg./dm. ²) and % inhibition for an immersion period of (values in the bracket represent percentage inhibition)				
		1-day	3-day	5-day	7-day	9-day
0.2 N	0.00	56.8	119.9	216.1	271.4	376.5
	0.05	—	—	195.3 (9.8)	—	—
	0.1	—	—	26.6 (87.7)	—	—

	0.2	8.3 (85.4)	13.9 (88.4)	24.9 (88.4)	67.7 (75.1)	88.1 (76.6)
	0.5	—	—	24.9 (88.4)	—	—
	1.0	—	—	24.6 (88.5)	—	—
0.5 N	0.00	63.7	207.8	426.6	512.2	587.2
	0.05	—	—	353.4 (17.2)	—	—
	0.1	—	—	47.0 (89.0)	—	—
	0.2	11.1 (82.6)	18.1 (91.3)	25.5 (94.0)	43.9 (91.7)	47.0 (91.7)
	0.5	—	—	24.9 (94.2)	—	—
	1.0	—	—	24.9 (94.2)	—	—
1.0 N	0.00	63.7	468.1	878.2	1100.0	1568.0
	0.05	—	—	600.3 (31.6)	—	—
	0.1	—	—	30.2 (96.6)	—	—
	0.2	9.7 (84.8)	21.3 (95.4)	28.0 (96.8)	51.0 (95.4)	73.1 (95.3)
	0.5	—	—	27.7 (96.8)	—	—
	1.0	—	—	27.7 (96.8)	—	—

Ammonium Chloride+Gelatine

		1-day	3-day	5-day	7-day	9-day
2 N	0.00	56.8	119.9	216.1	271.4	376.5
	0.1	—	—	251.7 (-16.5)	—	—

	0.2	—	—	225.5 (-4.3)	—	—
	0.5	—	—	181.8 (15.9)	—	—
	1.0	—	—	38.5 (82.2)	—	—
	2.0	13.6 (76.1)	32.7 (72.6)	30.7 (85.8)	169.8 (37.4)	653.7 (-73.6)
	0.5 N	0.00	63.7	207.8	426.6	512.2
	0.1	—	—	543.3 (-27.4)	—	—
	0.2	—	—	535.0 (-25.4)	—	—
	0.5	—	—	454.8 (-8.3)	—	—
	1.0	—	—	242.2 (43.2)	—	—
	2.0	21.3 (66.6)	50.4 (75.7)	129.0 (69.8)	492.2 (4.4)	944.0 (-60.8)
	1.0 N	0.00	63.7	468.1	878.2	1100.0
	0.1	—	—	1167.0 (-32.9)	—	—
	0.2	—	—	1029.0 (-28.8)	—	—
	0.5	—	—	606.1 (19.6)	—	—
	1.0	—	—	392.1 (55.2)	—	—
	2.0	12.5 (80.4)	44.0 (90.5)	149.8 (82.9)	712.2 (35.3)	1813.0 (-15.7)

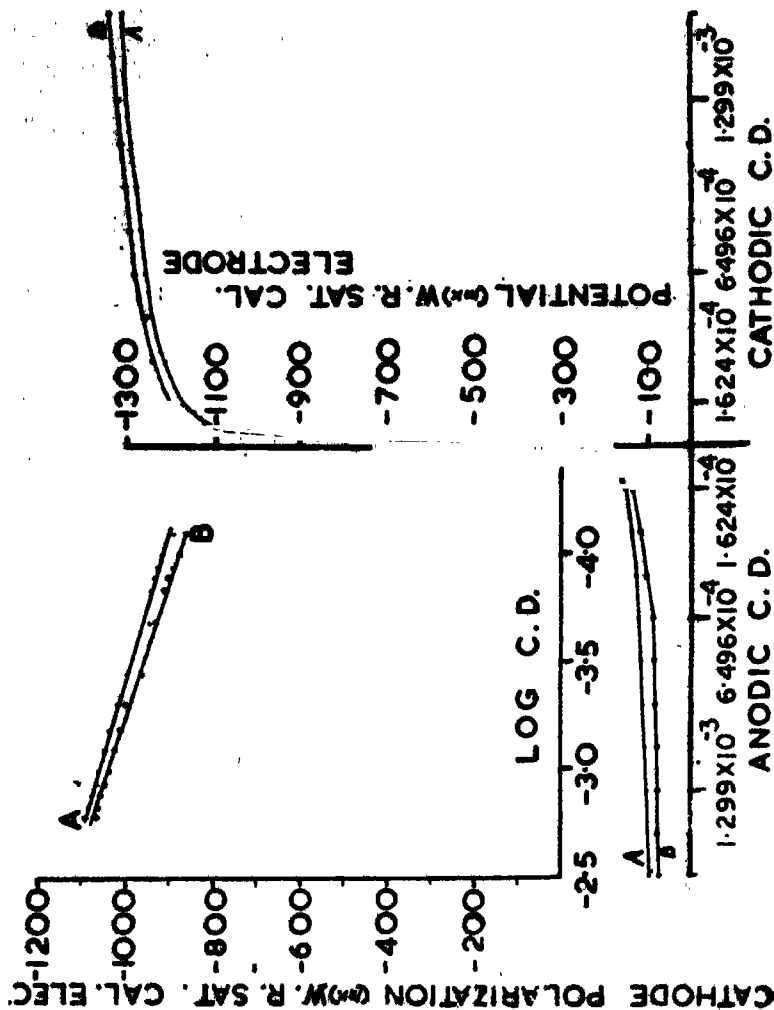


Fig. 1

The effect of current density on the potentials of anode and cathode (A-0.5 N Ammonium chloride; B-0.5 N Ammonium chloride + 0.2 % Agar) and a plot of log C.D. versus cathode Polarization (A-0.5 N Ammonium chloride + 0.2 % Agar; B-0.5 N Ammonium chloride).

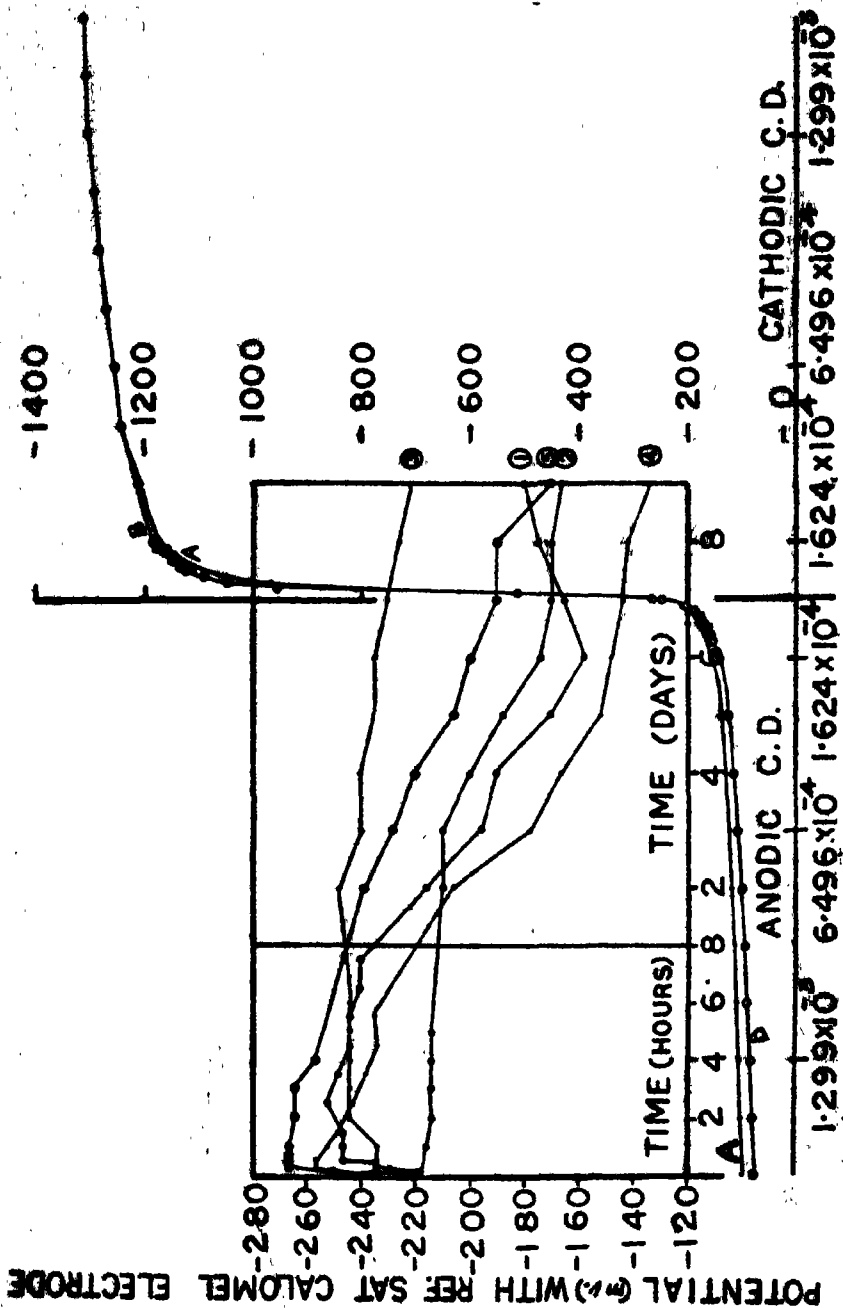


Fig. 2

The effect of current density on the potentials of anode and cathode (A-0.5 N Ammonium chloride; B-0.5 N Ammonium chloride + 2.0% Gelatine) and a plot of change in potential of copper in presence and absence of Agar and Gelatine (1-0.5 N Ammonium chloride; 2-0.5 N Ammonium chloride + 0.05% Agar and Gelatine).

References

1. Desai, M. N., Tahiti, J. D., et al., *Werkstoff und Korrosion*, **12**, 277-9, 1961.
2. Kohler, W., *Werkstoff und Korrosion*, **14**, 11-14, 1963.
3. Ritter, F., vide Ref. 2.
4. Rabald, E., and Bretschneider, *Dechema-Werkstofftabelle: Ammonium chloride*, DWT 107.
5. Desai, M. N., and Trivedi, A. M., *Werkstoffe und Korrosion*, **10**, 26, 1959; **12**, 277, 1961; **14**, 740, 1963; *Indian. J. Appl. Chem.*, **21**, 137, 1958.
6. Desai, M. N., and Rana, S. S., *Ind symposium on corrosion inhibitors*, Ferrara, Sez V, 299-310, 1965.
7. Hackerman, N., and Makrides, A. C., *Ind. Eng. Chem.*, **46**, 523, 1954.

INHIBITION OF THE CORROSION OF COPPER IN ACETIC ACID SOLUTIONS

M. N. DESAI and S. S. RANA

*Chemistry Department
University School of Sciences
Gujarat University, Ahmedabad-9*

The results of the effect of gelatine, acacia, starch, egg-albumen, agar and dextrine on the corrosion of brass in citric¹, acetic² and malic³ acids were reported earlier. The action mechanism of gelatine in inhibiting the corrosion of brass in citric acid was also studied by potential and polarization measurements⁴. The present work deals with the inhibition of the corrosion of electrolytic copper in acetic acid by acacia and tannic acid.

Experimental

Electrolytic copper (6 cm. \times 3 cm., thickness 28 S.W.G.), supplied by Messrs Kamani Metals and Alloys Ltd., Bombay was used in this investigation. The preparation of the metal specimens for corrosion tests was carried out as before⁵. For determining the loss in weight of the metal specimens, a small hole was drilled near one end of the specimen, which, suspended by a pyrex glass hook, was completely immersed in acetic acid solutions (230 ml.) of varying concentrations without and with different concentrations of the inhibitors for different periods of time. All experiments were carried out at 35°C. Only one specimen was suspended in each container (pyrex beaker).

For potential and polarization studies, the metal electrode was made of a circular design with a diameter of 2.802 cm. and provided with a handle 3 cm. long and 0.5 cm. wide. The handle was coated with perspex varnish and the back of the electrode was also protected with the same varnish. Thus only one circular side of the electrode with an apparent surface area

5.156 cm² was exposed. Polarization studies were made with copper as cathode or anode in 0.5 N acetic acid solutions with and without inhibitor at 35°C, the other electrode being platinum of the same dimensions. An H-type pyrex glass cell with porous partition to separate the two compartments was used. In each compartment, the volume of the liquid was 80 ml. It also contained a built in capillary to make connection to the reference electrode. The current density was increased successively in the range $0-1.624 \times 10^{-3}$ amp./cm.²

Results and Discussion

Results are recorded in Table 1. The corrosion of copper decreases with increase in the concentration of acetic acid.

Acacia :

In 0.2 N acetic acid, for five days duration, at a concentration of 0.05% of acacia, the corrosion of copper is retarded to an extent of 64.3%. The corresponding retardation of corrosion in 0.1 N and 0.5 N acetic acid is respectively 31.3% and 2.8%. Even when the results are compared in 0.1 N, 0.2 N and 0.5 N acetic acid solutions in the presence of 1% acacia, it has been found that the corrosion of copper is retarded to a greater extent in 0.1 N and 0.2 N acetic acid solutions than that in 0.5 N acetic acid. Even though the corrosion of copper in 0.5 N acetic acid is less as compared to that in 0.1 N and 0.2 N solutions, inhibition effect of acacia on the corrosion of copper is less, in the more concentrated (0.5 N) solution.

In 0.2 N acetic acid, during three and five days duration, the effect of increasing the concentration of acacia from 0.1% to 2% is not felt in the sense that the corrosion of copper is retarded practically to the same extent between the range of 0.1% to 2% of acacia.

In 0.2 N acetic acid in the presence of 1% acacia, the efficiency of acacia increases with time up to seven days and thereafter it decreases, whereas in 0.5 N solution at the

corresponding concentration of acacia, the efficiency decreases with time.

As compared to copper, acacia is more effective for 70/30 brass, in the sense that, 70/30 brass is protected to an extent of about 95 % in the presence of 0.5 % acacia (0.2 N acetic acid, five days duration). It is interesting to note that between 0.05% to 0.2 % of acacia, the corrosion of copper and 70/30 brass is retarded practically to the same extent in 0.2 N acetic acid (five days duration).

Tannic acid :

Tannic acid appears to be more effective than acacia in 0.2 N and 0.5 N acetic acid; however in 0.1 N acetic acid, acacia brings about greater protection to copper than tannic acid.

In 0.2 N acetic acid, the efficiency (%) of tannic acid increases or practically remains constant with duration at all concentrations of tannic acid except at 0.01%. At 0.1 % concentration of tannic acid, the corrosion of copper in 0.1 N, 0.2 N and 0.5 N acetic acid is retarded respectively to 22.4%, 72.4 % and 47.9 % (five days duration). In 0.2 N acetic acid for three days duration, the influence of the concentration of the inhibitor on retardation of the corrosion is clearly perceptible, thus the difference in the inhibitor efficiency at 0.1 % and 2 % tannic acid is about 16 %; however with time this difference diminishes and for nine days duration it is about only 4%.

Potential and Polarization studies :

Electrode potential measurements have been employed very widely for inhibitors study and they have contributed greatly to the understanding of corroding systems. The potential of a metal is frequently in itself of little importance. The changes it undergoes in the presence of inhibitors are however of prime significance. The shifting of potential to more positive values or more negative values may lead to either higher or lower corrosion rates depending upon whether the shift corresponds

to higher or lower current. The corrosion inhibition may take place even without any shift of the electrode potential of the metal. The shift of the potential to more positive values is indicative of anodic polarization if it is associated by a decrease of the corrosion rate and the shift of the potential to more negative values is an indication of cathode polarization.

In acetic acid, cathode polarization is very high as compared to anode polarization. The open circuit potential of copper in acetic acid in presence of acacia moves towards negative direction. Thus, the open circuit potential of copper in 0.5 N acetic acid without acacia is 10 mv. (w.r.t. sat. cal. electrode), whereas in the presence of 0.05 %, 0.1 %, 0.2 %, 0.5 %, 1.0 % and 2.0 % acacia, the open circuit potentials are respectively +0.15 mv., -10 mv., -17 mv., -23 mv., -30 mv., and -34 mv. In the presence of tannic acid also, the open circuit potential of copper in 0.5 N acetic acid shifts towards negative direction, e.g., in the presence of 0.05 %, 0.1 %, 0.2 %, 0.5 %, 1.0 % and 2 % tannic acid, the open circuit potentials are respectively -6 mv., -10 mv., -14 mv., -20 mv., -26 mv. and -32 mv. This suggests the polarization of local cathodes in the case of both these inhibitors and is probably due to the preferential adsorption of these inhibitors on the local cathodic areas.

The change in potential of copper with time in 0.5 N acetic acid without and with 2 % acacia and in the presence of 0.2 % tannic acid is shown in fig. 1. It can be seen from the fig. 1 that in the case of both these inhibitors, the values are throughout more negative as compared to the corresponding values in 0.5 N acetic acid alone.

The effect of current density on the cathode and anode potentials in 0.5 N acetic acid in the absence and the presence of 2 % acacia and in the presence of 0.2 % tannic acid is shown in fig. 2. It has been found that in the presence of acacia, the cathode polarization is increased considerably at low and higher current densities as compared to intermediate current densities. It must also be noted that the polarization of anode

is also considerable and this is particularly remarkable at higher current densities. Thus, at current densities 1.624×10^{-3} , 1.624×10^{-4} , 8.12×10^{-4} , 1.624×10^{-5} amp./cm.², the anode polarization values in the absence and in the presence of 2% acacia are respectively 10 mv., 30 mv., 43 mv., 99 mv., 187 mv., and 110 mv., 186 mv., 251 mv., 812 mv., 1324 mv. In the presence of 0.2% tannic acid also, both the anode and cathode are polarized considerably and at higher current densities, i.e., between the range of 1.13×10^{-3} and 1.624×10^{-3} amp./cm.², the anode gets polarized to a much more extent than the cathode. Thus from the polarization data the action of both acacia and tannic acid can be considered to be of mixed type.

In fig. 3, the cathode polarization in 0.5 N acetic acid in the absence and the presence of 0.2% tannic acid is plotted versus log current density. From the graph, the values of the exchange current density without and with tannic acid are respectively 1×10^{-7} amp./cm.² and 1.328×10^{-8} amp./cm.² Similarly from fig. 4, the exchange current density obtained in the presence of 2% acacia is 4.988×10^{-8} amp./cm.² The efficiency of the inhibitors can be calculated by the formula.

$$100 \times \frac{i_0 \text{ (without inhibitor)} - i_0 \text{ (with inhibitor)}}{i_0 \text{ (without inhibitor)}}$$

By this way, the % efficiency of tannic acid comes out to be 86.8% and that of acacia 50.1%.

The mechanism of corrosion inhibition is generally believed to be due to the formation and maintenance of protective film on metal surface. Organic substances of high molecular weight including many colloidal substances appear to form a film over the metal surface generally and interfere with the attack partly by hindering the replenishment of corrosive substances and partly in other ways. Kreutzfeld⁶ investing Starch, Yeast etc., as inhibitors for steel in sulphuric acid suggested that these substances form a continuous insulating adsorbed layer on the metal surface. Schunkert⁷ from his studies of colloids such as gelatine, casein, starch, dextrine and eggabu-

that concluded that these substances are adsorbed on the anodic regions of the metal.

Evans supported the theory of cathodic action. Tikhonov⁸ suggested that the colloidal inhibitors are transported to cathodes or anodes by electrophoresis forming gelatinous film on the metal surface. Machu⁹ objects to the cathodic adsorption theory and believes that organic inhibitors are generally molecularly adsorbed.

In recent years it has been shown that inhibitors increase the anodic as well as the cathodic polarization. In the present investigation we have seen that both the inhibitors increase the cathodic and the anodic polarization.

Thanks of the authors are due to Prof. B. K. Vaidya for keen interest in the work. Thanks are also due to the Gujarat State Industrial Research Board for the research grant and for awarding a Fellowship to one of us. (S. S. Rana).

TABLE I

Variation of inhibitor efficiency with time and the effect of inhibitor concentration on inhibitor efficiency.

0.1 N Acetic Acid + Acacia

Inhibi- tion concen- tration	3 days Loss mg/dm ²	% Inhibi- tion	5 days Loss mg/dm ²	% Inhibi- tion	7 days Loss mg/dm ²	% Inhibi- tion	9 days Loss mg/dm ²	% Inhibi- tion
1	2	3	4	5	6	7	8	9
0.00	—	—	124.7	—	—	—	—	—
0.01%	—	—	124.7	—	—	—	—	—
0.05%	—	—	85.6	31.3	—	—	—	—
0.1 %	—	—	71.3	43.8	—	—	—	—
0.2 %	—	—	51.2	58.9	—	—	—	—
0.5 %	—	—	44.0	64.7	—	—	—	—
1.0 %	—	—	30.7	75.4	—	—	—	—
2.0 %	—	—	27.4	78.0	—	—	—	—

1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

0.2N Acetic Acid + Acacia

0.00	69.0	—	106.4	—	190.5	—	231.6	—
0.01	36.8	46.7	62.6	41.2	133.8	29.8	200.5	13.4
0.05	26.9	61.0	38.0	64.3	92.2	51.6	157.3	32.1
0.1	23.8	65.5	23.8	77.6	78.1	59.0	135.2	41.6
0.2	23.5	65.9	23.8	77.6	78.1	59.0	112.2	51.6
0.5	23.5	65.9	23.8	77.6	69.0	63.8	108.0	53.4
1.0	23.5	65.9	23.8	77.6	32.4	83.0	51.8	77.7
2.0%	23.5	65.9	23.8	77.6	28.0	65.3	50.1	78.4

0.5N Acetic Acid + Acacia

0.00	42.9	—	95.8	—	119.1	—	141.3	—
0.05%	—	—	93.1	2.8	—	—	—	—
0.1 %	—	—	77.6	19.0	—	—	—	—
0.2 %	—	—	52.1	45.6	—	—	—	—
0.5 %	—	—	52.1	45.6	—	—	—	—
1.0 %	18.3	57.3	47.0	50.9	60.1	49.5	84.2	40.4
2.01	—	—	47.0	50.9	51.0	57.2	67.9	51.9

0.1N Acetic Acid + Tannic acid

0.00	—	—	124.7	—	—	—	—	—
0.05%	—	—	113.6	8.9	—	—	—	—
0.1 %	—	—	96.8	22.4	—	—	—	—
0.2 %	—	—	63.7	48.9	—	—	—	—
0.5 %	—	—	63.7	48.9	—	—	—	—
1.0 %	—	—	44.3	64.5	—	—	—	—
2.0 %	—	—	44.3	64.5	—	—	—	—

0.2N Acetic Acid + Tannic acid

0.00	69.0	—	106.4	—	190.5	—	231.6	—
0.01%	—	—	48.2	54.7	57.6	69.8	130.7	43.6
0.1 %	23.6	65.8	29.4	72.4	35.2	81.5	37.4	83.8
0.2 %	23.6	65.8	28.0	74.0	29.9	64.5	30.7	86.7
0.5 %	18.2	73.6	18.8	82.3	26.3	86.2	29.1	87.5
1.0 %	14.1	79.6	15.0	85.9	26.3	86.2	29.1	87.5
2.0 %	12.7	81.6	15.0	85.9	22.7	88.1	27.4	88.0

1	2	3	4	5	6	7	8	9
0.5N Acetic Acid + Tannic acid								
0.00	42.9	—	95.8	—	119.1	—	141.3	—
0.05%	—	—	63.7	33.5	—	—	—	—
0.1 %	—	—	49.9	47.9	—	—	—	—
0.2 %	—	—	20.5	78.6	—	—	—	—
0.5 %	—	—	18.3	80.9	—	—	—	—
1.0 %	—	—	16.9	82.3	—	—	—	—
2.0 %	14.1	67.1	15.2	84.1	21.6	81.9	24.6	82.6

References

1. M. N. Desai & A. M. Trivedi, Werkstoffe und. Korrosion, **10** (1959), 26.
2. M. N. Desai & Y. C. Shah, Werkstoffe und. Korrosion, **14** (1963), 740.
3. M. N. Desai & J. D. Talati, et. al, Werkstoffe und. Korrosion, **12** (1961), 277.
4. M. N. Desai, Werkstoffe und. Korrosion, **8** (1965), 681.
5. M. N. Desai & A. M. Trivedi, Indian. J. Appl. Chem., **21** (1958), 137-41.
6. W. Kreutzfeld, Korrosion und. Metallaschutz **4**, 104 (1928).
7. M. Schunkert, Z. Phys. Chem. A. **19** (1933), 167.
8. M. K. Tikhonov, Izd Akad. Nauk. U.S.S.R. (1940).
9. W. Machu & M. G. Fouad, Werkstoffe und. Korrosion, **8** (1957), 139-45.

POTENTIAL (mV) WITH REF. TO SAT. CAL. ELECTRODE

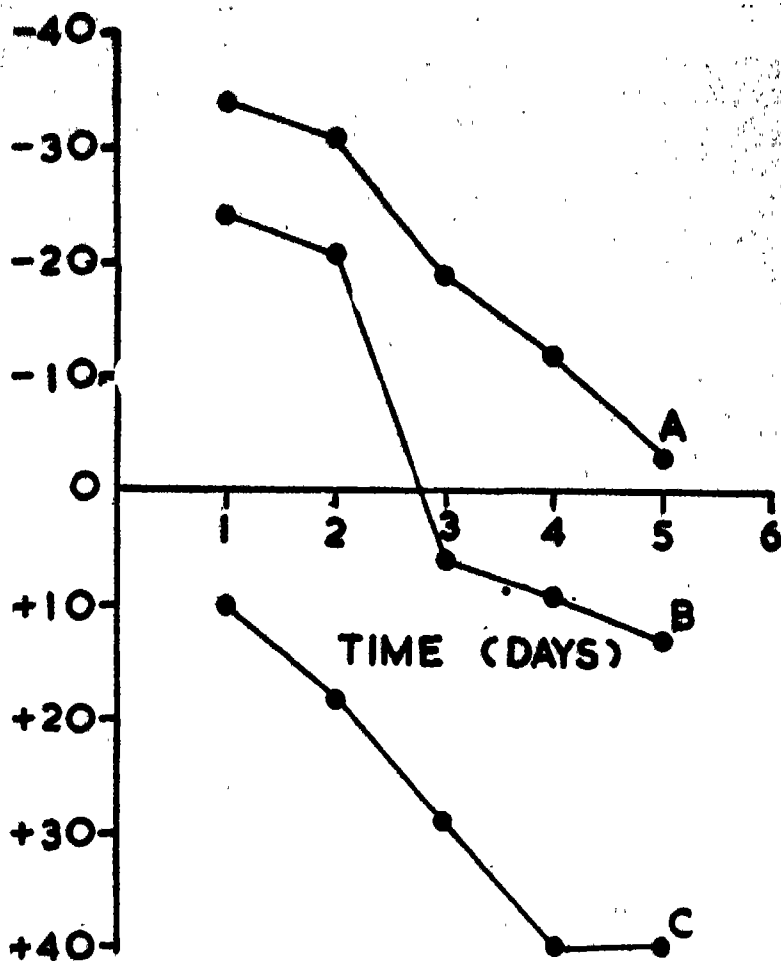


Fig. 1 / The change in potential with time :

(A) 0.5 N acetic acid + 2.0 % acacia

(B) 0.5 N acetic acid + 0.2 % tannic acid

(C) 0.5 N acetic acid

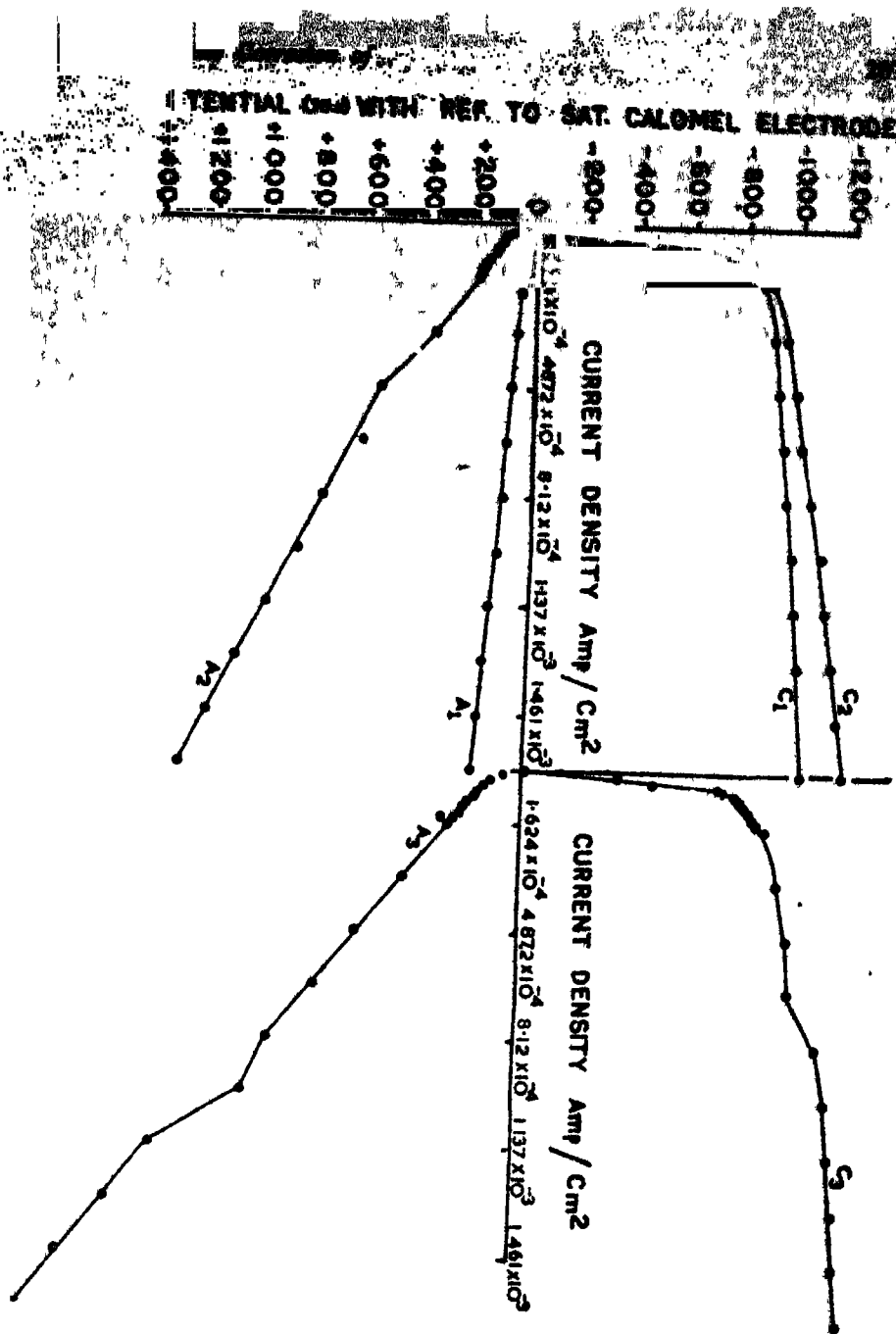


Fig. 2 / Effect of current density on anode and cathode potentials

- (A₁) 0.5 N acetic acid - Anode potentials
- (A₂) 0.5 N acetic acid + 2% acacia - Anode potentials
- (A₃) 0.5 N acetic acid + 0.2% tannic acid - Anode potentials
- (C₁) 0.5 N acetic acid - Cathode potentials
- (C₂) 0.5 N acetic acid + 2% acacia - Cathode potentials
- (C₃) 0.5 N acetic acid + 0.2% tannic acid - Cathode potentials

CATHODE POLARIZATION CURVES REF. TO SHE CATHODE ELECTRODE

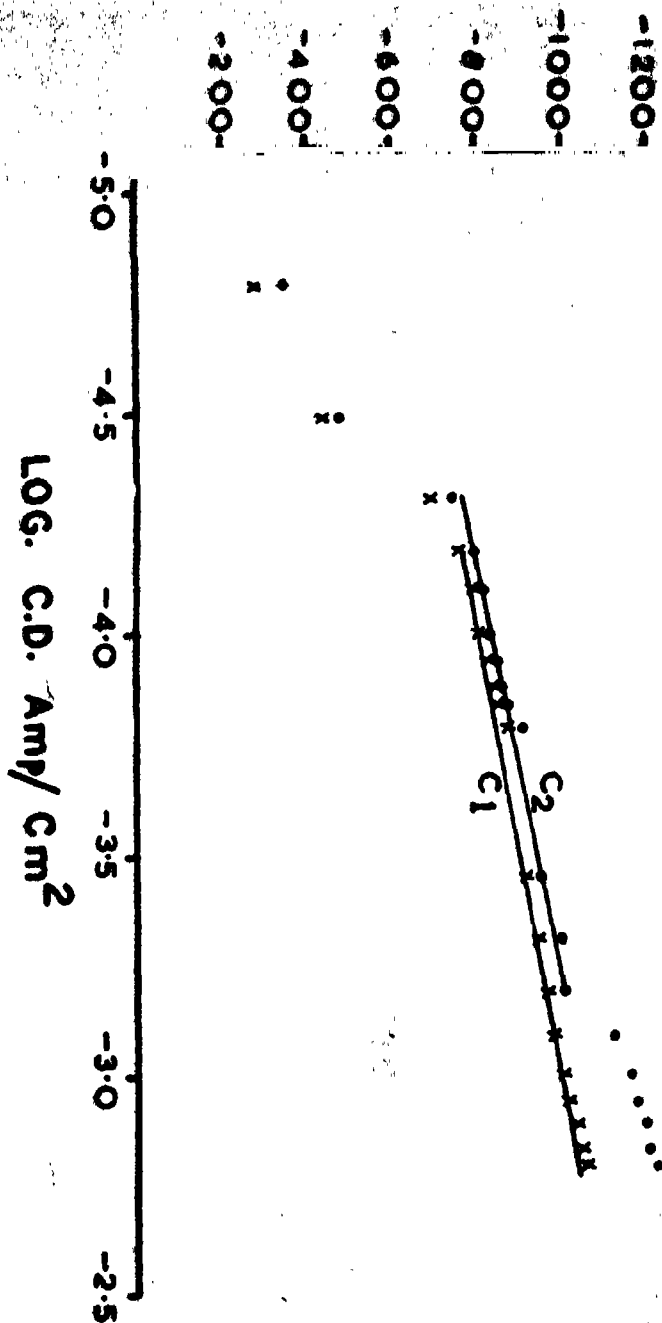


Fig. 3 / A plot of Log. C. D. vs. Cathode polarization
(C₁) 0.5 N acetic acid
(C₂) 0.5 N acetic acid + 0.2% tannic acid

CATHODE POLARIZATION CURVES REF TO SAT CALOMEL ELECTRODE

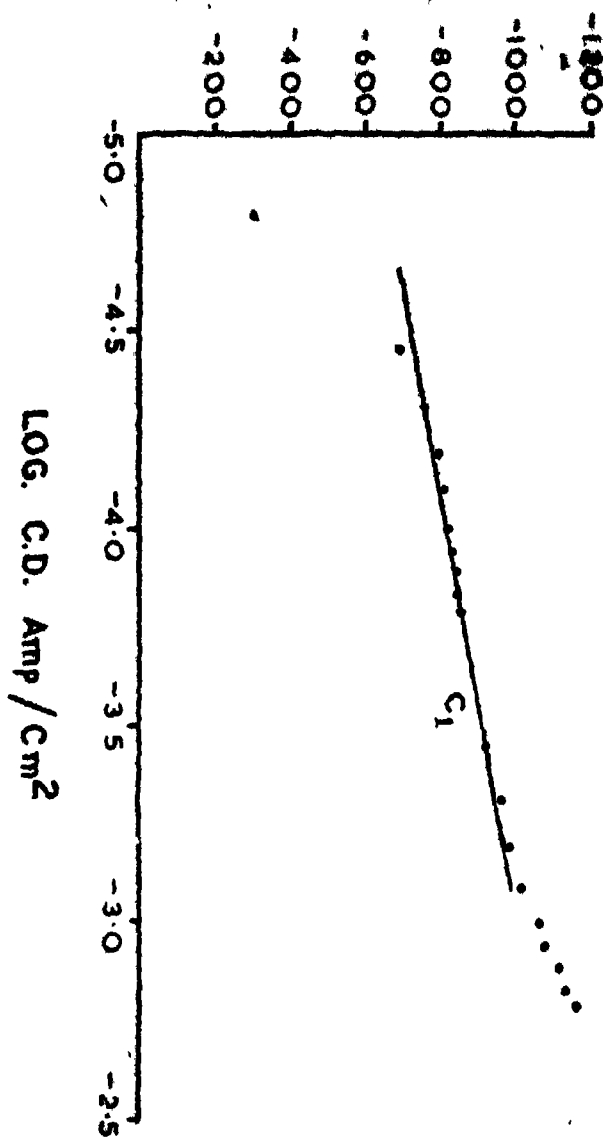


Fig. 4 / A plot of Log. C.D. vs. Cathode polarization
(C₁) 0.5 N acetic acid + 2% acacia.

PROPERTIES OF NEGATIVELY CHARGED COLLOIDAL IRON OXIDE

S. J. DOCTOR and A. M. TRIVEDI

M. G. Science Institute, and
University School of Sciences,
Gujarat University, Ahmedabad-9

Negatively charged Iron Oxide sols have been prepared with hydroxyl as a stabilizing ion and NH_4^+ as a gegenion. The presence of Sucrose is essential for the stability of the sol. Determination of coagulation values by cations of different valencies shows that it is a negatively charged sol. Addition of organic substances sensitizes the sol in the case of acetone, propyl alcohol, iso-propyl alcohol, ethyl alcohol and methyl alcohol, the order of sensitization being the same as above. On the other hand, glycerine and glycol stabilizes the sol. The effect of organic substances is explained on the basis of the existing theories. Determination of coagulation values at different temperatures shows that 'E', the energy involved in coagulation process is of the order of 6 kilocalories.

Experimental

Iron oxide sols have been extensively investigated.^{1,2} Sols are positively charged and the micelles are considerably hydrated. On the other hand, negatively charged iron oxide sols are not easy to prepare. Such sols are stable only in presence of Sucrose and the micelles are much less hydrated. Thus the micelles in the case of negatively charged sol contain 6 moles of water per mole of iron oxide³ as compared to 70 moles of water per mole of iron oxide in positively charged sol.⁴

In the present investigation, the coagulation values (C.V.) of the sol and the effect of organic substances on C.V. is being reported.

The preparation of the sol has been reported before (loc. cit. 3). The sol contain hydroxyl as a stabilizing ion and NH_4^+

as a gegenion. The presence of Sucrose is essential for the stability of the sol.

The coagulation value of sols have been extensively studied. One may determine either the coagulation curve or simply the coagulation value which is a single, but an important point in the coagulation curve. The method of determining coagulation value is that of Freundlich⁶ with slight modifications. It simply determines the concentration of the electrolyte to coagulate the sol so that supernatant liquid becomes clear within two hours.

The following sols have been studied and the effect of organic substances as well as the temperature on the coagulation has been determined :

Sol A : Fe_2O_3 —5.12 gms./lit., Sucrose—39.52%, free chloride in traces, free ammonia in traces, pH value 7.6.

Sol B : Fe_2O_3 —4.26 gms./lit., Sucrose—41.28%, free chloride in traces, free ammonia in traces, pH value 7.5.

Sol C : Fe_2O_3 —4.64 gms./lit., Sucrose—15.0%, free chloride in traces, free ammonia in traces, pH value 7.4.

Sol D : Fe_2O_3 —6.68 gms./lit., Sucrose—15.0%, free chloride in traces, free ammonia in traces, pH value 7.6.

The table below gives the coagulation value in mm./litre when the sol is coagulated by different electrolytes.

TABLE I

	NaCl	KCl	MgCl_2	BaCl_2	AlCl_3
Sol A	64	60	2.70	0.80	0.076
Sol B	152	128	6.40	1.60	0.100
Sol C	128	98	4.50	1.14	0.130
Sol D	146	136	5.00	1.30	0.204

Effect of temperature on coagulation value.

Sol C and D has been utilised for the effect of temperature on coagulation value.

The Table II gives the data on C. V. at different temperatures.

TABLE II

C. V. in m.m./litre

		NaCl	KCl	MgCl ₂	BaCl ₂	AlCl ₃
Sol C	30°	128	98	4.5	1.14	0.130
	50°	78	74	2.3	0.80	0.130
	70°	34	30	1.2	0.42	0.100
Sol D	30°	146	136	5.0	1.30	0.204
	50°	—	—	3.6	1.08	0.204
	70°	50	46	1.3	0.64	0.136

Discussion

Schulze and Hardy⁶ were the first to discuss the relation between the charge on colloidal particles and the nature and valency of coagulating ions. According to Schulze and Hardy rule, the ion, effective in precipitation of Sols by the electrolytes is the ion opposite in sign to the charge on colloidal particles. It is referred to as the precipitating ion. The precipitating power of the effective ion increases greatly with increasing valence of the ion. The precipitating power of the ion is in the order of trivalent > bivalent > univalent. In the present case, it is clear that the particles of the sol are negatively charged as the precipitating power of aluminium (trivalent cation) is greater than magnesium (bivalent cation) which is greater than sodium ion or potassium ion (monovalent ion). Taking the coagulation power of the most effective ion as unity, the values for the bivalent and monovalent ions are 1 : 11 : 790 (Sol A—AlCl₃, BaCl₂, KCl). This is remarkably close to the values suggested by Verwey.⁷ This confirms the hydrophobic nature of the Sol. However, there is wide diversion between the ions of the same valence, for e.g., divalent ions. Hence one may conclude that the Schulze-Hardy rule may be applicable to typical hydrophobic Sol (Solvation very low). However, the rule is only an approximate one and many factors such as nature of the ion, its adsorbility, depression ionisation of the stabiliz-

ing electrolytes, etc. will have to be considered before a quantitative picture of the coagulating power of different electrolytes is obtained.

We shall now consider effect of organic substances on coagulation. Addition of organic substances sensitizes the Sol in the case of acetone, propyl alcohol, iso-propyl alcohol, ethyl alcohol, and methyl alcohol, the order of sensitization being the same as above, acetone being the most sensitizing agent. On the other hand, glycol and glycerine stabilizes the Sol. The results are graphically illustrated in the case of Sol B.

Many attempts have been made to explain the effect of organic substances on coagulation. The non-electrolytes may be adsorbed by the colloidal particles. This may not be easy to prove experimentally. If the adsorption at the interface is assumed, it will lead to lowering of the dielectric constant, as organic solvents have decidedly lower dielectric constants as compared to that of water. This will lead to a depression of the charge on the micelles (loc. cit. 5). The lowering of the coagulation value is most marked in the case of monovalent ions. The amount of lowering is the greatest for electrolytes with weakly adsorbed precipitating ion that precipitate only in relatively high concentration.⁸ Weiser is further of the opinion that the adsorption of non-electrolytes may cut down the adsorption of the precipitating ion of the electrolyte added. This would raise the coagulation value of the electrolyte. Since these two factors act in opposite direction, it would be possible to explain either lowering or raising of the coagulation value. Chatterji and Ramnath⁹ are of similar opinion.

An important factor for sensitization with alcohol appears to be the dehydrating effect of alcohol on the micelles. Overbeek and Burgenberg de Jong¹⁰ studied the viscosity of many colloids when diluted with water and alcohol and concluded that the decrease of $\frac{n_s - n_0}{n_0}$ from the view point of Einstein's equation must be interpreted as a process of desolvation. The dehydration effect of alcohol is also realised by Fisher and Sorum¹¹ who

studied the applicability of Burton-Bishop rule to chromium oxide sol, aluminium oxide sol and stannic oxide sol. They found that only highly purified Sols in which the micelles are very greatly hydrated obey Burton-Bishop rule when, however, a highly purified Sol which obeys Burton-Bishop rule was diluted with alcohol instead of water, the rule was not obeyed. This is obvious due to the dehydrating action of the organic substances such as alcohols.

The stabilizing effect of glycerol and glycol may be due to the adsorption of OH ions by the micelles, thus increasing the concentration of stabilizing ion. In the case of positively charged iron oxide sol both these reagents act as sensitizing reagents when the Sol is coagulated with potassium chloride."

On increasing the temperature, the coagulation value is decreased. Hence coagulation is an exothermic process. The results are more accurate in the case of monovalent ions as the coagulation values are fairly high. Knowing the coagulation values at different temperatures, the temperature coefficient may be calculated. It comes out to be 16×10^{-3} (in relevant units). The value of 'E' which may be considered the energy involved in the coagulation processes, may also be calculated. It comes out to be about 6 kilocalories.

Acknowledgement

Our thanks are due to Mr. P. J. Patani for checking the analytical data. Thanks are due to the Principal, M. G. Science Institute and the Director, University School of Sciences for providing laboratory facilities.

References

1. Mitra and Dhar : J.I.C.S., 9 (1932), 315.
2. Fair : J. Phy. Chem., 38 (1934), 19.
3. Doctor, Patani, Trivedi : J.I.C.S., 42, (1965), 142.
4. Divatia, Patani, Trivedi, Proc. Ind. Acad. Sci., Vol. 37, No. 1, Sec A (1953).
5. Freundlich : Capillary Chemistry, P. 416 (1926), Published by Methuen Co. Ltd., 36 Essex Street, W.C. London.
6. Schulze : J. Prakt. Chem., (2) 25 (1882), 431; 27 (1883), 329; 32 (1885), 390; Hardy.

7. Verwey : J. Phys. Coll. Chem., 51 (1947), 631.
8. Weiser : J. Phy. Chem., 28 (1924), 232, 1253, 1263.
9. Chatterji and Ramnath : J.I.C.S., 26 (1949), 73.
10. Overbeek and Burgenberg de Jong : Kruyt, Colloid Science, Part II (1949), p. 201, Published by Elsevier publishing Co., Inc., New York.
11. Fisher and Sorum : J. Phy. Chem., 44 (1940), 62.
12. Private Communication from Mr. P. J. Patani.

